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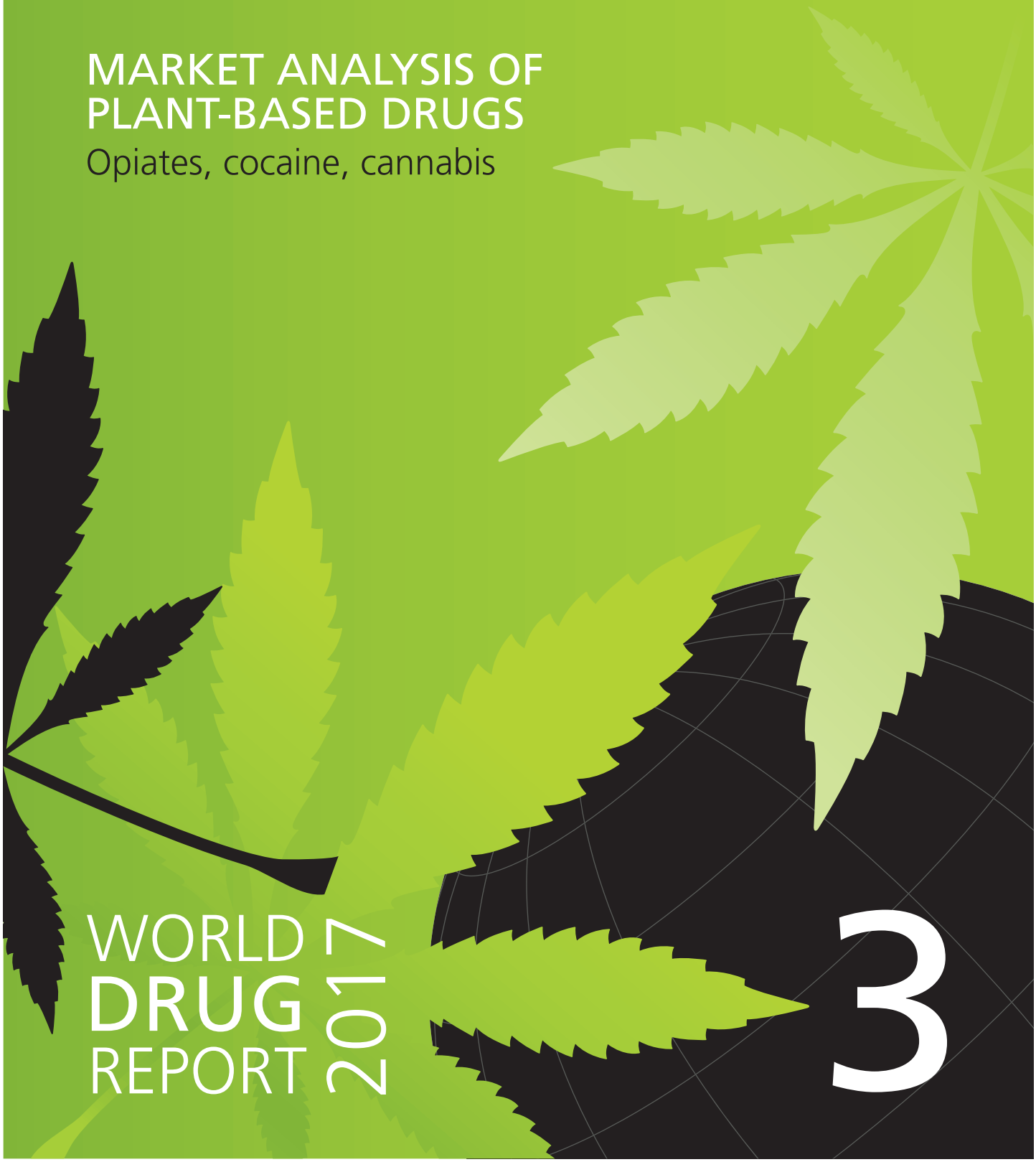
MARKET ANALYSIS OF PLANT-BASED DRUGS

Opiates, cocaine, cannabis



WORLD DRUG REPORT 2017

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This booklet constitutes the third part of the *World Drug Report 2017*.

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PREFACE

I am proud to say that this year we are marking 20 years of the *World Drug Report*.

Over the past two decades, the United Nations Office on Drugs and Crime (UNODC) has been at the forefront of global research into complex areas of drug use and supply, supporting international cooperation and informing policy choices with the latest estimates, information on trends and analysis.

This year we are launching a new format, with the report available as five separate booklets: the executive summary, together with the report's conclusions and policy implications; a global overview of drug use and supply; a market analysis of plant-based drugs; a market analysis of synthetic drugs; and a thematic booklet on the links between drugs and organized crime, illicit financial flows, corruption and terrorism. We have done this in response to readers' needs and to improve user-friendliness, while maintaining the rigorous standards expected from the Office's flagship publication.

The 2017 report comes at a time when the international community has acted decisively to achieve consensus on a way forward for joint action.

The outcome document unanimously adopted at last year's special session of the General Assembly on the world drug problem contains more than 100 concrete recommendations for implementing balanced, comprehensive and integrated approaches to effectively addressing and countering the world drug problem.

Moreover, at its sixtieth session, in March 2017, the Commission on Narcotic Drugs adopted resolution 60/1, reinforcing commitment to implementing the outcome document and charting a course to the 2019 target date of the 2009 Political Declaration and Plan of Action on the world drug problem, as well as strengthening action towards the Plan of Action's agreed goals and targets.

As the *World Drug Report 2017* clearly shows, there is much work to be done to confront the many harms inflicted by drugs, to health, development, peace and security, in all regions of the world.

Globally, there are an estimated minimum of 190,000 — in most cases avoidable — premature deaths from drugs, the majority attributable to the use of opioids.

The terrible impact of drug use on health can also be seen in related cases of HIV, hepatitis and tuberculosis.

Much more needs to be done to ensure affordable access to effective scientific evidence-based prevention, treatment and care for the people who desperately need them, including those in prison settings. As just one example, this year's report highlights the need to accelerate accessibility to the treatment of hepatitis C, a disease whose negative health impact on people who use drugs is far greater than that of HIV/AIDS.

Recent attention has focused on the threats posed by methamphetamine and new psychoactive substances (NPS). However, as the report shows, the manufacture of both cocaine and opioids is increasing. These drugs remain serious concerns, and the opioid crisis shows little sign of stopping.

The *World Drug Report 2017* further looks at the links with other forms of organized crime, illicit financial flows, corruption and terrorism. It draws on the best available evidence and, most of all, highlights the fact that much more research needs to be carried out in these areas.

Corruption is the great enabler of organized crime, and opportunities for corruption exist at every stage of the drug supply chain. However, too little is known about how different types of corruption interact with drug markets.

The outcome document of the special session of the General Assembly on the world drug problem and

Security Council resolutions express concern about terrorist groups profiting from drug trafficking, among other forms of transnational organized crime.

It is well established that there are terrorists and non-State armed groups profiting from the drug trade — by some estimates, up to 85 per cent of opium poppy cultivation in Afghanistan is in territory under influence of the Taliban.

However, evidence on the organized crime-terrorism nexus remains patchy at best. Moreover, these links are not static. Relations between organized crime and terrorists groups are always evolving, much like drug markets themselves.

As we have seen with the NPS market, drug use, supply, trafficking routes and the substances themselves continue to shift and diversify at alarming speed.

Drugs continue to represent a major source of revenue for organized crime networks, but business models are changing, with criminals exploiting new technologies, such as the darknet, that are altering the nature of the illicit drug trade and the types of players involved, with looser, horizontal networks and smaller groups becoming more significant. New ways of delivering drugs further point to the need to involve other sectors such as postal services in the fight against drug trafficking.

Clearly, countries must be able to act and react to an ever-changing and formidable array of threats and problems. UNODC is fully engaged in strengthening responses, working closely with our United Nations partners and in line with the international drug control conventions, human rights instruments and the 2030 Agenda for Sustainable Development, which are themselves complementary and mutually reinforcing.

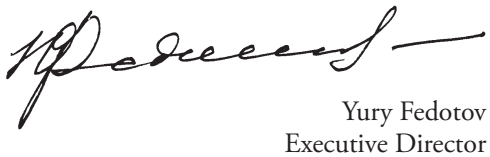
As the special session of the General Assembly and the recent session of the Commission on Narcotic Drugs have shown, the international community is equipped to respond swiftly and decisively to global drug-related challenges.

For example, in March, the Commission scheduled two precursors and an analogue to the scheduled drug fentanyl. This important step will make it harder for criminals to illicitly manufacture fentanyl and its analogues and, I hope, can help to stem the tragic increase in opioid overdoses in recent years.

However, there remains an enormous need for capacity-building and technical assistance, and funding continues to fall far short of political commitment. Further resources are urgently needed to help all Member States implement the recommendations contained in the outcome document of the special session of the General Assembly and achieve related targets under the Sustainable Development Goals.

The many evolving drug challenges also highlight the importance of prevention — science- and rights-based drug use prevention — but also prevention of crime, corruption, terrorism and violent extremism, in line with commitments under the conventions and United Nations standards and norms.

Finally, I ask all Governments to help us improve the evidence base for these reports. Areas such as the links between drugs, terrorism and insurgency clearly touch upon sensitive intelligence, and there are legitimate concerns about compromising sources, collection and operations. But if we want to effectively address drug challenges we need to strengthen international cooperation and information-sharing to the extent possible, to close the gaps and ensure that joint action is targeted, effective and timely.



Yury Fedotov
Executive Director
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EXPLANATORY NOTES

The boundaries and names shown and the designations used on maps do not imply official endorsement or acceptance by the United Nations. A dotted line represents approximately the line of control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties. Disputed boundaries (China/India) are represented by crosshatch owing to the difficulty of showing sufficient detail.

The designations employed and the presentation of the material in the *World Drug Report* do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area, or of its authorities or concerning the delimitation of its frontiers or boundaries.

Countries and areas are referred to by the names that were in official use at the time the relevant data were collected.

All references to Kosovo in the *World Drug Report*, if any, should be understood to be in compliance with Security Council resolution 1244 (1999).

Since there is some scientific and legal ambiguity about the distinctions between "drug use", "drug misuse" and "drug abuse", the neutral terms "drug use" and "drug consumption" are used in the *World Drug Report.*

All uses of the word "drug" in the *World Drug Report* refer to substances under the control of the international drug control conventions.

All analysis contained in the *World Drug Report* is based on the official data submitted by Member States to the United Nations Office on Drugs and Crime through the annual report questionnaire unless indicated otherwise.

The data on population used in the *World Drug Report* are taken from: United Nations, Department of Economic and Social Affairs, Population Division, *World Population Prospects: The 2015 Revision.*

References to dollars ($) are to United States dollars, unless otherwise stated.

References to tons are to metric tons, unless otherwise stated. R stands for the correlation coefficient, used as measure of the strength of a statistical relationship between two or more variables, ranging from 0 to 1 in case of a positive correlation or from 0 to -1 in case of a negative correlation.

KEY FINDINGS

Opium production on the increase

In 2016, global opium production increased by one third compared with the previous year. Although there was also an increase in the size of the area under opium poppy cultivation, the major increase in opium production was primarily the result of an improvement in opium poppy yields in Afghanistan compared with the previous year. At 6,380 tons, however, total global opium production was still some 20 per cent lower than at its peak in 2014, and was close to the average reported in the past five years.

Seizures of both opium and heroin have remained quite stable at the global level in recent years, suggesting a smooth supply of heroin, irrespective of annual changes in opium production. The quantity of heroin seized in North America increased sharply in 2015. This went in parallel with reports of increasing heroin use and heroin-related deaths in that subregion.

Growing importance of Caucasus branch of the Balkan route

Drug flows are in a constant state of flux. With the changes brought by globalization and the spread of new communications technologies, drug flows are characterized more than ever by rapid changes in trafficking routes, modi operandi and concealment methods.

With about 40 per cent of global heroin and morphine seizures in 2015 being made in countries on the so-called "Balkan route", the route appears to remain the world's principal opiate trafficking route. While overall quantities seized on the Balkan route declined in 2015, an alternative branch of the route, through the Caucasus countries, appears to have been gaining in importance in recent years. That route circumvents Turkey, where the recent increase in flows of refugees heading towards countries in the European Union may have pushed traffickers to seek other options.

Expansion of the cocaine market

Data on drug production, trafficking and use point to an overall expansion of the market for cocaine worldwide. Following a long-term decline, coca bush cultivation increased by 30 per cent during the period 2013-2015, mainly as a result of increased cultivation in Colombia. Total global manufacture of pure cocaine hydrochloride reached 1,125 tons in 2015, representing an overall increase of 25 per cent over 2013.

Cocaine use appears to be increasing in the two largest markets, North America and Europe. The prevalence of use of cocaine among the general population and testing in the workforce suggest an increase in cocaine use in the United States. In Europe, early signs of increases in cocaine consumption, based on wastewater analysis, have been reported.

The quantities of cocaine seized are also on the increase; they reach a record level of 864 tons in 2015 worldwide.

Cocaine trafficking expanding eastwards

Although still comparatively small overall, there are indications that cocaine consumption in several countries in Asia continues to rise. Possible proof of this was a very large seizure (900 kg) of cocaine in Sri Lanka in 2016 and another of 500 kg in Djibouti in 2017, which was probably en route to Asia.

Overall, in 2015, the quantities of cocaine intercepted in Asia increased by more than 40 per cent compared with the previous year, with increases reported across all subregions.

Increasingly effective law enforcement

Reflecting improvements in international cooperation, law enforcement seems to be becoming increasingly effective. Evidence of this is the fact that the estimated global interception rate of cocaine increased to between 45 and 55 per cent in 2015,

a record level. The estimated global interception rate of opiates also rose from between 9 and 13 per cent during the period 1980-1997 to between 23 and 32 per cent during the period 2009-2015.

Crossover between plant-based and synthetic cannabinoids

Synthetic cannabinoid receptor agonists were first reported in 2004 as new psychoactive substances (NPS). Synthetic cannabinoids are a diverse group of psychoactive substances that are dissimilar to tetrahydrocannabinol (the principle psychoactive constituent of natural cannabis).

Despite the predominance of synthetic cannabinoids on the spectrum of NPS, users of cannabis have reported that they prefer natural cannabis. The use of synthetic cannabinoids is perceived by users to be associated with more overall negative effects than the use of natural cannabis. Indeed, there is growing recognition of the harms associated with intoxication resulting from the use of synthetic cannabinoids. Such harms include tachycardia, psychosis, agitation, anxiety, breathing difficulties and seizures. It cannot be concluded, however, that the untoward or undesirable effects of synthetic cannabinoids will limit their uptake or use.

Most jurisdictions in the United States now permit access to medical cannabis while nine allow the cultivation of cannabis for recreational use

The latest voter initiatives in the United States, in 2016, allowed the legalization of cannabis for recreational use in an additional four states. Cultivation of cannabis for recreational use is now allowed in eight states and the District of Columbia. Of greater importance is that in those jurisdictions, with the exception of the District of Columbia, licences are now granted to for-profit companies to produce and sell a range of products for the medical and non-medical use of cannabis.

In the jurisdictions where the recreational use of cannabis is now permitted, cannabis use has increased among the adult population and remains higher than the national average. This trend preceded the change in legislation in those jurisdictions, however. It is difficult to quantify the impact of the new cannabis legislation as it seems that a combination of elements was already in the process of changing the cannabis use market in those jurisdictions when the legalization measures were put in place.

The major increase in cannabis use in those jurisdictions started in 2008, in parallel with measures allowing the medical use of cannabis (although the cannabis products dispensed have not gone through the rigours of pharmaceutical product development), decreasing risk perceptions of harm from cannabis use and an ongoing debate around the legalization of the medical and recreational use of cannabis. Since the approval of legalization measures, the increasing trend in cannabis use in those jurisdictions has continued.

Yet while the increases in those jurisdictions are more marked than in states where such use has not been legalized, cannabis use has increased at the national level. The developments observed in the jurisdictions where the use of cannabis has been legalized (including the perception of risk of harm from cannabis use) appear to have affected the cannabis market and users' perceptions of cannabis nationwide. It has been observed that increases in cannabis use across the United States are disproportionally associated with adults with a low socioeconomic status who are regular and heavy users of cannabis.

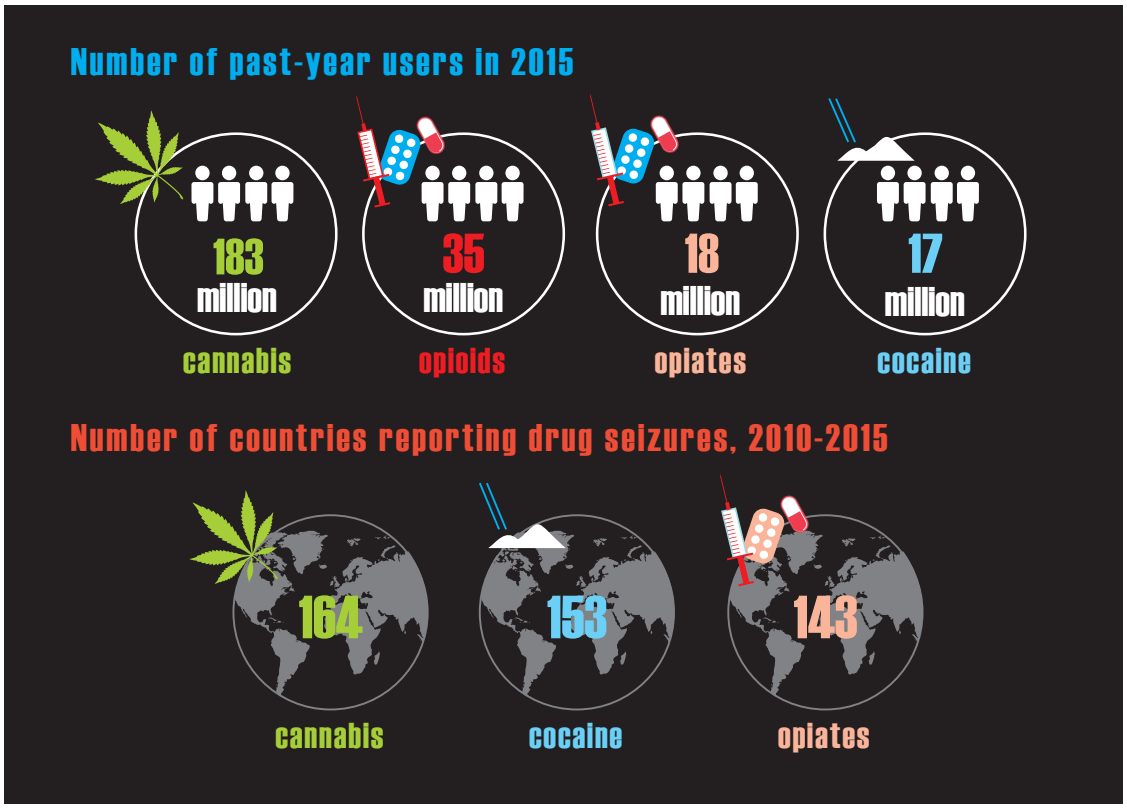
Cannabis regulation in Uruguay

In 2013, the Government of Uruguay approved legislation regulating the cultivation, production, dispensing and use of cannabis for recreational purposes. Since then, the Government has passed additional decrees and ordinances concerning the implementation of specific elements of the cannabis regulations. They include regulating the medical use of cannabis, the marketing and dispensation of cannabis for recreational use, including through pharmacies, and the registration of recreational cannabis users. However, the impact of the provisions regulating the recreational use of cannabis in Uruguay will be evident only after they have been fully implemented, and will require close monitoring over time.

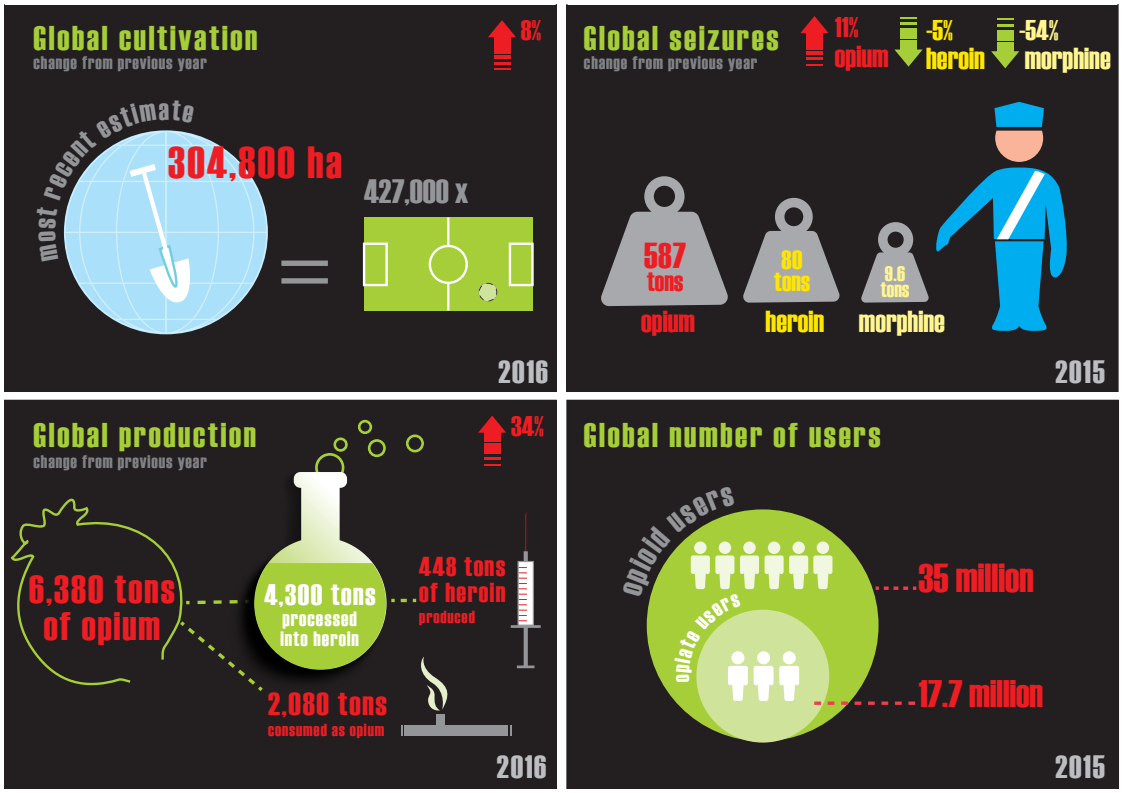
INTRODUCTION

Although presented as a stand-alone publication, this booklet constitutes the third chapter of the *World Drug Report 2017*. It presents market analysis for the three plant-based drugs — cocaine, opiates (opium, morphine and heroin) and cannabis — and examines current estimates and trends in their cultivation and production. The section on markets also examines recent developments in, and estimates of, seizures made on major trafficking routes and in destination countries, as well as significant developments in the consumption of the plant-based drugs in all regions.

This booklet subsequently examines the major developments in the jurisdictions in the United States of America that have measures allowing cultivation of cannabis for recreational use, as well as issues surrounding the medical use of cannabis across the country. An analysis is presented of patterns and trends in cannabis use both among the adult and youth populations in those jurisdictions and in the United States as a whole. Finally, the booklet provides an update on the implementation of legislation in Uruguay regulating the recreational use of cannabis.



A. THE OPIATE MARKET



Notes: Data on cultivation and production/manufacture refer to 2016. Data on seizures and numbers of users refer to 2015. Seizures of different substances are of varying purity. Estimates of cultivation and eradication of opium poppy, production of opium, manufacture of heroin and prevalence of opioids and opiates use are available in the annex of booklet 2.

Global production of opiates increased by around 30 per cent in 2016

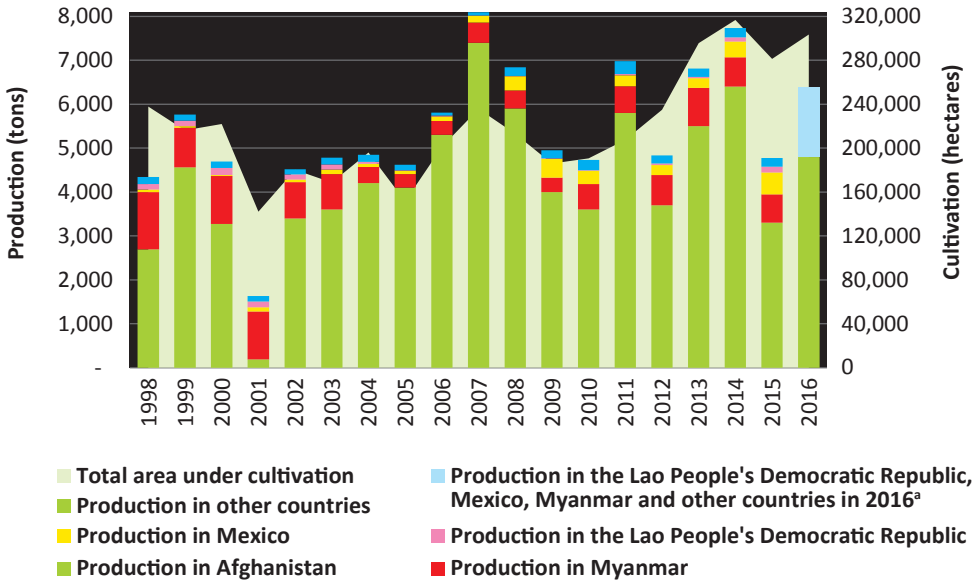
Opium is illicitly produced in around 50 countries worldwide, with the main areas of production being located in three subregions. Countries in South-West Asia (mainly Afghanistan) supply markets in neighbouring countries and in countries in Europe, the Near and Middle East/South-West Asia, Africa and South Asia, with small proportions going to East and South-East Asia, North America and Oceania. Countries in South-East Asia (mainly Myanmar and, to a lesser extent, the Lao People's Democratic Republic) supply markets in East and South-East Asia and in Oceania. Countries in Latin America (mostly Mexico, Colombia and Guatemala) mainly supply the United States of America and the more limited markets in South America.

In 2016, the global area under opium poppy cultivation increased in size by 8 per cent from the level of the previous year, to 304,800 hectares (ha), primarily reflecting an increase reported in the cultivation of opium poppy in Afghanistan that year (10 per cent). With 201,000 ha under opium poppy cultivation, Afghanistan accounted for roughly two thirds of the estimated global area under illicit opium poppy cultivation in 2016.

No estimate of the area under opium poppy cultivation in Myanmar in 2016 is available, but the 2015 estimate was 55,000 ha, making Myanmar the world´s second largest opium-producing country that year (20 per cent of the total area under opium cultivation in 2015). A socioeconomic survey was, however, undertaken by the United Nations Office on Drugs and Crime (UNODC) in 2016 in Shan State,[1] which in recent years has accounted for

1 UNODC and Myanmar, Central Committee for Drug Abuse Control, *Evidence for Enhancing Resilience to Opium Poppy Cultivation in Shat State, Myanmar: Implications for Alternative Development, Peace, and Stability* (Bangkok, 2017).

FIG. 1 | Opium poppy cultivation and production of opium, 1998-2016[a]



Sources: UNODC calculations based on illicit crop monitoring surveys and responses to the annual report questionnaire.
[a] *Only preliminary data are available for 2016.*

around 90 per cent of Myanmar's total poppy cultivation and opium production. The survey revealed that the proportion of villages producing opium poppy fell from 31 per cent of all villages in Shan State in 2015 to 22 per cent in 2016: a decrease of almost 30 per cent. However, this trend has been offset by an increase in the size of the average area under opium poppy cultivation, from 0.4 ha to 0.6 ha per household where cultivation is taking place, suggesting an increasing concentration of opium poppy cultivation in Shan State. At the same time, 2016 saw an increase of 5 per cent in the price of opium, which may point to a decline in production (or an increase in demand).

Based on 2014/2015 estimates (26,100 ha), the third largest area worldwide under opium poppy cultivation was identified as being that in Mexico. No estimate of the area under opium poppy cultivation in the Lao People's Democratic Republic in 2016 is available, but the 2015 estimate was 5,700 ha.

Based on available cultivation and yield data, global opium production increased by more than 30 per cent from the level of the previous year, to around 6,380 tons[2] in 2016. This increase was primarily a reflection of the rising level of opium production reported in Afghanistan (a 43 per cent increase from the level of the previous year), which was mainly the result of a partial recovery in the extremely poor yields in its southern and western provinces recorded a year earlier.

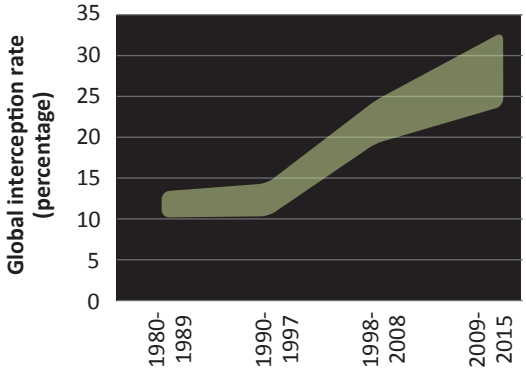
Of the 6,380 tons of opium produced worldwide in 2016, it is estimated that some 2,100 tons remained unprocessed for consumption as opium, while the rest was processed into heroin, resulting in an estimate of some 448 tons of heroin manufactured worldwide (expressed at export purity).

Seizures of opiates have decreased in recent years

After a long-term upward trend since the beginning of the new millennium, global quantities of opiates seized, expressed in heroin equivalents, have been

2 Data for 2016 are still preliminary as information from other major producing countries, except Afghanistan, is still missing. Totals were calculated assuming that such cultivation and production remained unchanged from a year earlier.

FIG. 2 Trends in the global interception rate of opiates, 1980-2015



Sources: UNODC calculations based on illicit crop monitoring surveys and responses to the annual report questionnaire.

Note: For details of the calculation methods, see the online methodology section of the present report.

declining since 2011. That decline was exclusively the result of morphine seizures falling from a peak in 2011, when large amounts of morphine were seized in Afghanistan. Otherwise, seizures of both opium and heroin have remained quite stable at the global level in recent years, in line with a fluctuating, although overall stable, level of opium production.

Largest seizures of opiates primarily in the Near and Middle East/South-West Asia

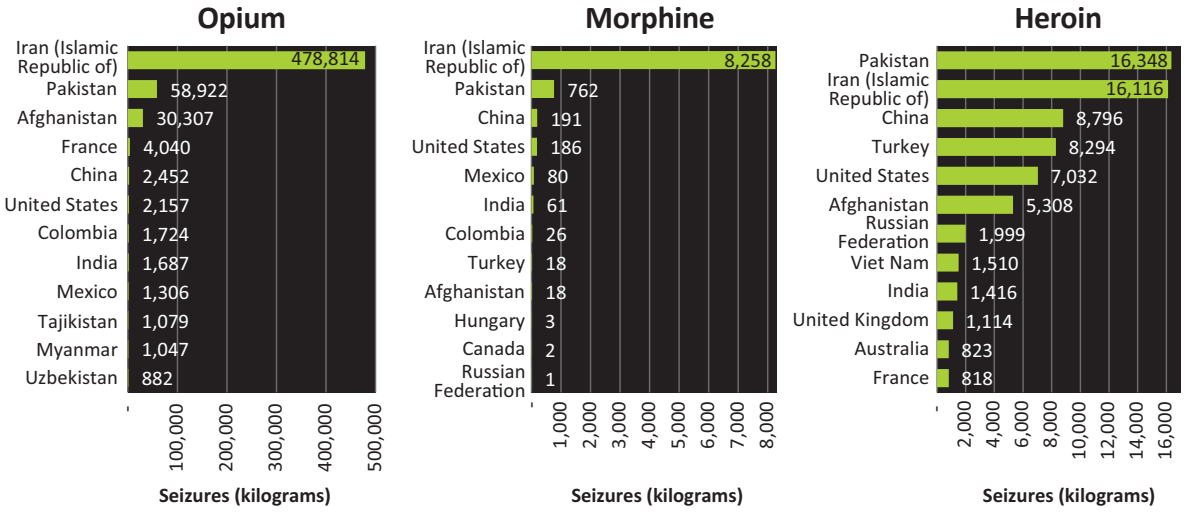
Reflecting the high concentration of opium production in Afghanistan, the largest opiate seizures in 2015 continued to be reported by countries in the Near and Middle East and South-West Asia, accounting for 97 per cent of the global quantity of opium, 94 per cent of morphine and 47 per cent of heroin seized that year. When all seizures of opiates, expressed in heroin equivalents, are considered, the Islamic Republic of Iran seized almost half (49 per cent) of the global total in 2015, followed by Pakistan (16 per cent), China, Turkey and Afghanistan (6 per cent each) and the United States (5 per cent).

In terms of seizures of heroin and morphine, Asia accounted for 70 per cent of the total quantity seized in 2015, while Europe accounted for 18 per cent and the Americas for 10 per cent, reflecting the concentration of opium production in Asia and Latin America, as well as opiate markets in Asia, Europe and North America.

Seizures of heroin and morphine decreased in Europe in 2015, but continued to increase in the Americas

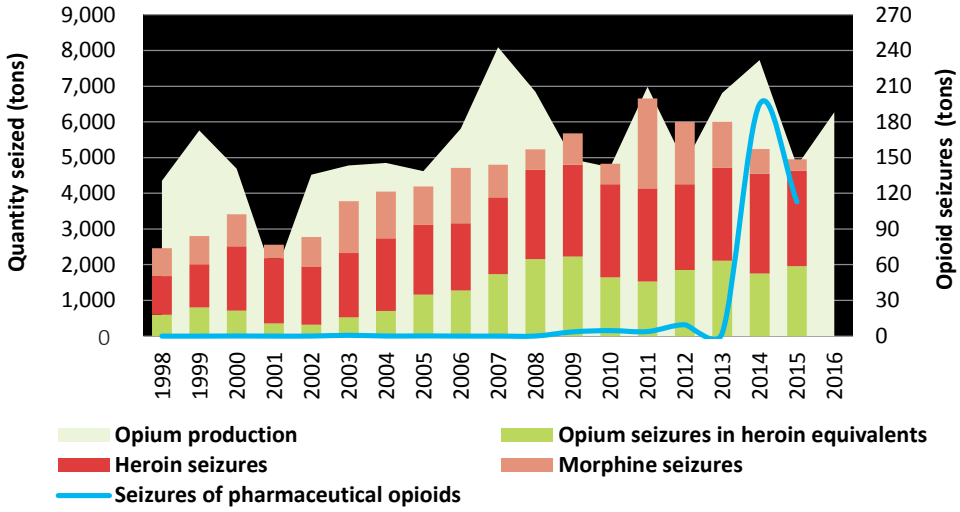
The decrease in the quantities of heroin and morphine seized in Asia since the peak of 2011 came to a halt in 2015 when quantities intercepted stabilized.

FIG. 3 Countries reporting largest quantities of opiates seized, 2015



Source: UNODC, responses to the annual report questionnaire.

FIG. 4 | Global opium production and quantities of opioids seized, 1988-2016



Source: UNODC, responses to the annual report questionnaire.

Note: A ratio of 10:1 was used to convert seizures of opium into seizures expressed in heroin equivalents.

In Europe, on the other hand, the quantities of heroin and morphine seized, which had been increasing over the period 2011-2014, fell in 2015, particularly in West and Central Europe (-56 per cent).

By contrast, the quantities of heroin and morphine seized in 2015 continued to increase in the Americas, particularly in North America (+21 per cent from the previous year).

Seizures of pharmaceutical opioids have reached the second-highest level ever reported

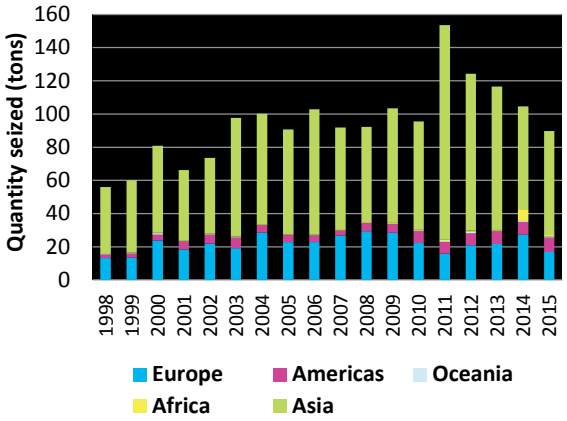
Largely linked to very large seizures of codeine and to comparatively smaller seizures of tramadol and buprenorphine, reported quantities of pharmaceutical opioids seized grew exponentially in 2014, exceeding global seizures of opiates (expressed in heroin equivalents) for the first time ever. Most of the pharmaceutical opioids intercepted in 2014 were reported by countries in South Asia, followed by countries in the Near and Middle East, suggesting significant levels of diversion and misuse of such substances in those subregions.

Although overall quantities of pharmaceutical opioids seized decreased in 2015, they were still larger than global heroin seizures and remained very high compared with the quantities intercepted before the peak of 2014. In 2015, pharmaceutical opioid seizures were dominated by tramadol, which, in terms of weight, increased more than fourfold from the level of the previous year. The largest seizures of pharmaceutical opioids in 2015 were reported in Africa, most notably in West and Central Africa, where large amounts of tramadol were seized, whereas most of the tramadol seized in the previous year was seized in countries in the Near and Middle East. The overall decline in seizures of pharmaceutical opioids in 2015 was primarily linked to smaller quantities of codeine being seized in South Asia in 2015 than in the previous year (for more details see booklet 2).

Most opiates continue to be trafficked along the Balkan route

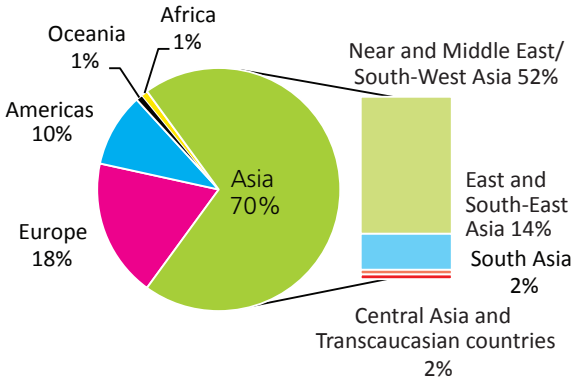
The main trafficking routes of opiates out of Afghanistan remain the so-called Balkan route (via the Islamic Republic of Iran and Turkey to West and Central Europe); the southern route (to South Asia, Gulf countries and other countries in the Near and Middle East and in Africa); and the northern route (through Central Asia to the Russian Federation). Seizures of heroin and morphine made along these routes (plus seizures made in Afghanistan, Pakistan and West and Central Europe) accounted for 75 per cent of global heroin and morphine seizures in 2015.

FIG. 5 Quantities of heroin and morphine seized, by region, 1998-2015



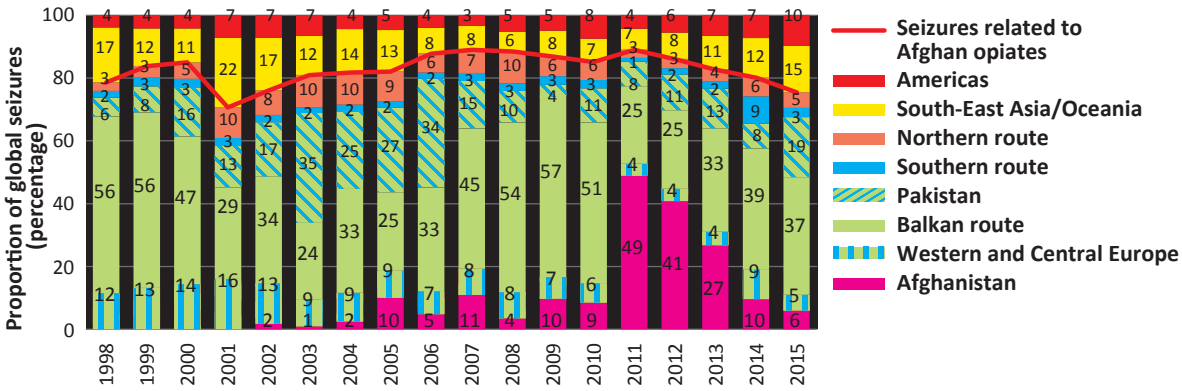
Source: UNODC, based on responses to the annual report questionnaire.

FIG. 6 Distribution of global quantities of heroin and morphine seized in 2015 (N= 90 tons)



Sources: UNODC, based on responses to the annual report questionnaire; and other government sources.

FIG. 7 Percentage distribution of quantities of heroin and morphine seized, by main trafficking route,[a] 1998-2015



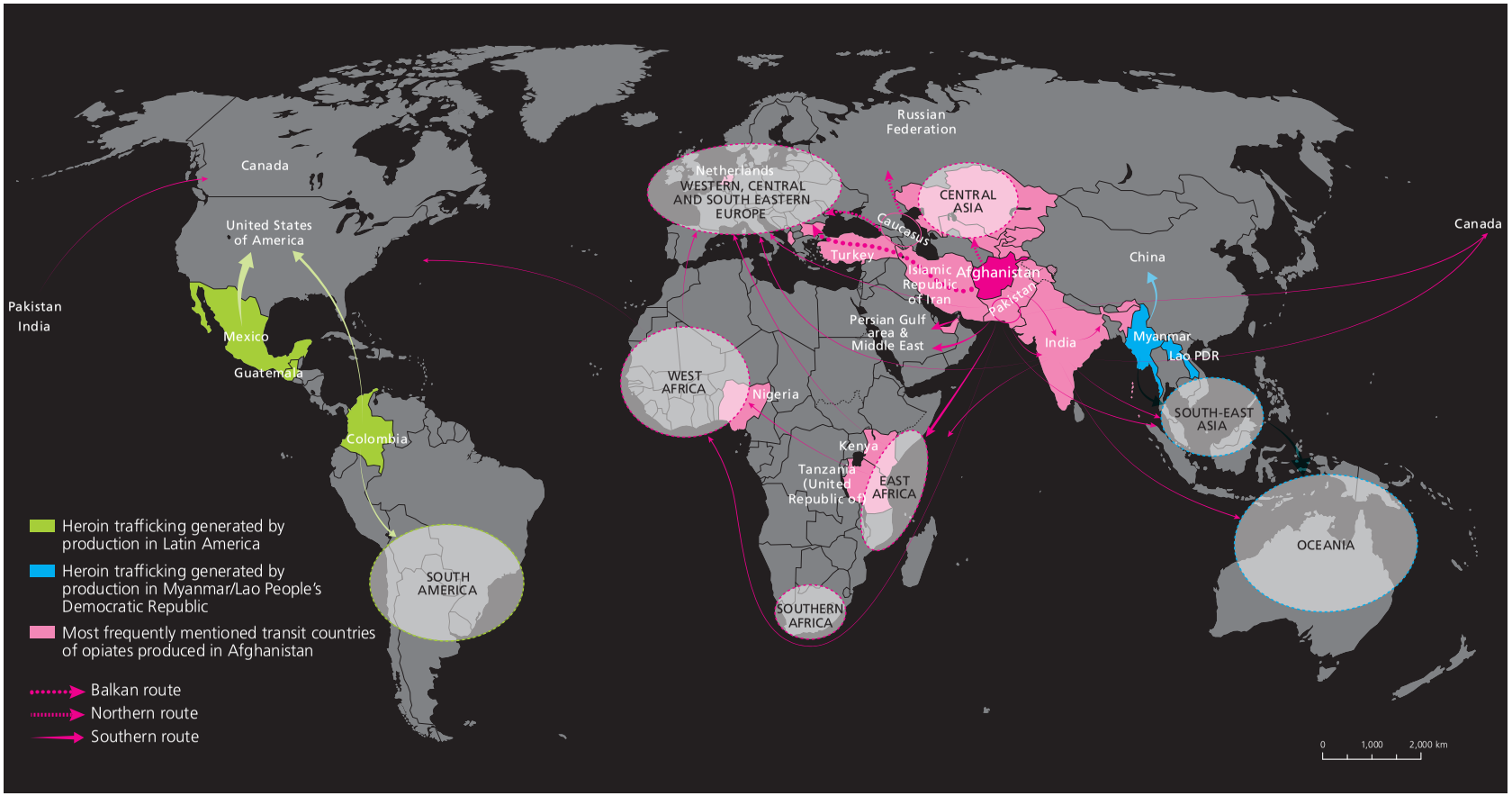
[a] *Balkan route: Islamic Republic of Iran, South-Eastern Europe; southern route: South Asia, Gulf countries and other countries in the Near and Middle East, Africa; northern route: Central Asia and Transcaucasia, Eastern Europe.*

Source : UNODC calculations, based on responses to the annual report questionnaire.

Seizure data suggest that the world's largest opiate-related trafficking activities continue to take place along the Balkan route. Overall, 37 per cent of the global quantity of heroin and morphine seized were reported by countries heavily affected by the trafficking of Afghan opiates along the Balkan route in 2015, or 43 per cent if seizures made in West and Central Europe are included (most of the quantities seized in that subregion are related to trafficking via the Balkan route). A breakdown of seizures shows that of the 34 tons of heroin and morphine seized on the Balkan route in 2015, the largest quantities were seized in the Islamic Republic of Iran (24.4 tons), Turkey (8.3 tons) and the Balkan countries of South-Eastern Europe (0.9 tons).

The importance of trafficking of Afghan opiates through the Balkan route is difficult to assess because a number of countries may be affected by different trafficking routes. For example, countries in Western and Central Europe may be supplied with Afghan opiates via both the Balkan route and the southern route. Another example is Pakistan, which reported

MAP 1 | Main opiate trafficking flows, 2011-2015



Sources: UNODC elaboration, based on responses to annual report questionnaire and individual drug seizure database.

Notes: The trafficking flows are determined on the basis of country of origin/departure, transit and destination of seized drugs as reported by Member States in the annual report questionnaire and individual drug seizure database: as such, they are to be considered as broadly indicative of existing trafficking routes while several secondary flows may not be reflected. Flow arrows represent the direction of trafficking: origins of the arrows indicate either the area of manufacture or the one of last provenance, end points of arrows indicate either the area of consumption or the one of next destination of trafficking. The boundaries shown on this map do not imply official endorsement or acceptance by the United Nations. Dashed lines represent undetermined boundaries. The dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties. The final boundary between the Sudan and South Sudan has not yet been determined. A dispute exists between the Governments of Argentina and the United Kingdom of Great Britain and Northern Ireland concerning sovereignty over the Falkland Islands (Malvinas).

very large seizures in 2015 (17 tons) that were often destined for countries on the southern route, while the Islamic Republic of Iran reported that 85 per cent of the heroin it seized in 2015 transited Pakistan prior to arriving on Iranian soil.

Emergence of a new trafficking route to Europe via the Caucasus

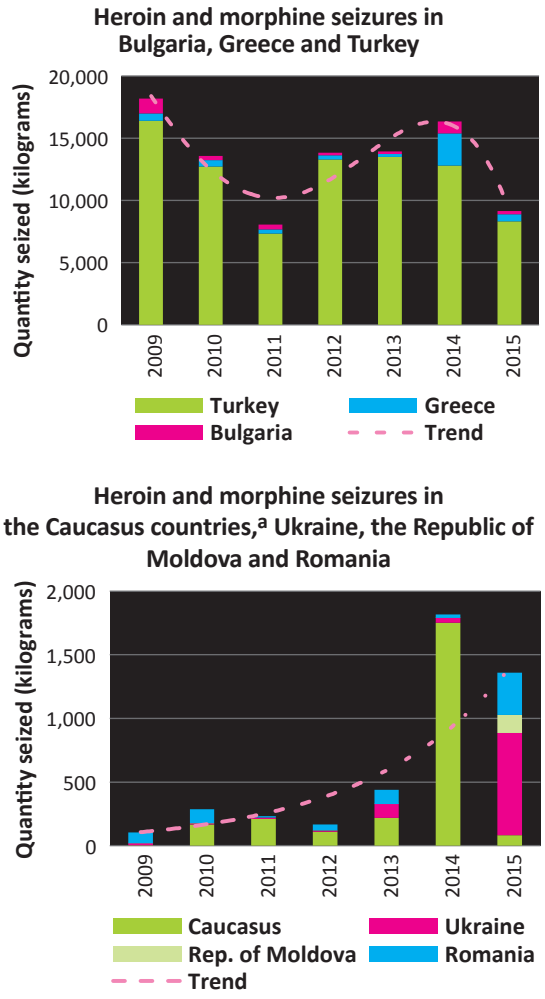
While overall seizures made along the Balkan route declined in 2015, an alternative branch of the route, through the Caucasus, seems to have been gaining in importance in recent years.[3, 4] That route circumvents Turkey, where the recent increase in flows of refugees heading towards countries in the European Union may have pushed traffickers to seek other options.

Heroin trafficked along this route is shipped from the Islamic Republic of Iran to Armenia or Azerbaijan and then to Georgia for shipment by sea to Ukraine (often Odessa) before being trafficked to Romania (or the Republic of Moldova), or directly from Georgia to ports along the Black Sea in European Union countries (notably Romania), before re-entering the eastern branch of the main Balkan route in Romania for trafficking onward to the Netherlands (93 per cent of heroin trafficked into Romania, according to Romanian authorities in 2015) and other countries in West and Central Europe. Romania, where for years the bulk of the heroin had previously transited Bulgaria (71 per cent in 2014), reported for the first time in 2015 that the vast majority (93 per cent) of it had transited Ukraine and only a small proportion (7 per cent) had transited Bulgaria.

While the northern route maintains its relative importance, changes in the southern route are less clear

Accounting for 5 per cent of total quantities of morphine and heroin seized in 2015, the next largest seizures reported in relation to Afghan opiates were made on the northern route. Most of the heroin destined for the northern route leaves Afghanistan via Tajikistan for onward trafficking either directly to Kazakhstan, or to Kyrgyzstan or Uzbekistan and subsequent trafficking to Kazakhstan and the Russian Federation. The trafficking of heroin via Turkmenistan, which shares a long border with Afghanistan, has not played much of a role so far, but that could change with the emergence of the Afghan province of Badghis, bordering Turkmenistan, as one of key opium-producing provinces in Afghanistan in 2016. At the same time, a route from Afghanistan to Pakistan and the Islamic Republic

FIG. 8 Quantities of heroin seized on the traditional Balkan route versus along the Caucasus branch of the Balkan route, 2009-2015



[a] *Armenia, Azerbaijan and Georgia.*

Source: UNODC, responses to the annual report questionnaire.

3 Europol, *SOCTA 2017: European Union Serious Organized Crime Threat Assessment (Crime in the Age of Technology* (The Hague, 2017), p. 38.

4 Individual seizures from the Drugs Monitoring Platform. For further information, see http://drugsmonitoring.unodc-roca.org.

of Iran, the Caucasus countries and the Russian Federation has also been developing. The Russian Federation reported that some 20 per cent of the heroin seized on its territory in 2015 had been trafficked by this route.

Afghan opiates trafficked on the southern route go to Pakistan (and partly to the Islamic Republic of Iran) for subsequent shipment to the Gulf countries and East Africa for shipment to Europe, either directly by air or via Southern or West Africa by air or by sea. Alternatively, drugs are trafficked along the southern route to India and other countries in South Asia for subsequent shipment to Europe or North America (mostly Canada). Countries in West and Central Europe reported that an average of roughly 6 per cent of the heroin found on their markets in 2015 had transited the southern route while 2 per cent had been directly shipped to Europe (mainly by air), although that figure differs greatly from country to country. The European countries most affected by opiates trafficked on the southern route in recent years are Belgium, Italy and possibly the United Kingdom of Great Britain and Northern Ireland. In 2015, almost 35 per cent of the heroin found in Belgium had transited the southern route (mainly via Burundi and Ethiopia). It was also reported that 12 per cent of the heroin found in Italy had transited the southern route (Qatar and the United Arab Emirates), while 9 per cent had transited Pakistan. Some 14 per cent of the heroin found in Germany was reported to have transited India, and France reported that 10 per cent had transited Madagascar in 2015.

The portion of the global quantity of opiates trafficked via the southern route (as reflected in quantities seized) has fluctuated over the years; down from a peak of 9 per cent in 2014, it accounted for 3 per cent of the global quantity of heroin and morphine seized in 2015. This decline was primarily the result of smaller quantities of heroin seized being reported by countries in Africa, where reported seizures of heroin and morphine fell from 7.1 tons in 2014 to 0.7 tons in 2015. However, UNODC is aware of seizures, totalling more than 2.1 tons of high purity heroin, made in international waters off the coast of East Africa in 2015 by the Combined Maritime Forces, which were not included in reports of heroin seizures by Member States.

The importance of the southern route in the trafficking of Afghan opiates is difficult to assess because of the weak capacity of interdiction and reporting of Member States in Africa. In addition, some of the opiates that transit Pakistan are destined for markets supplied via the southern route. Opiates seized in Pakistan increased sharply from 8 per cent in 2014 to represent 19 per cent of the global quantity intercepted in 2015, with the United Kingdom, Saudi Arabia and the United Arab Emirates (the latter country also for trafficking to other destination markets) being reported as main destination countries.

Seizures of opiates out of South-East Asia on the increase

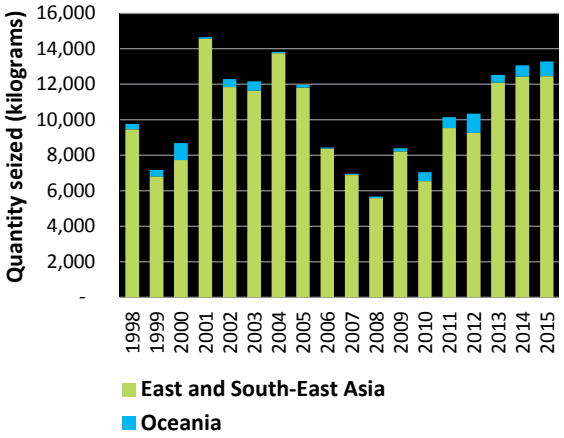
The markets supplied by opium produced in South-East Asia (notably Myanmar) are China and other countries in South-East Asia and Oceania. Little is currently known about trafficking flows from South-East Asia to Europe, Africa and the Americas. This is worth mentioning as in the past those regions were also supplied with opiates produced in South-East Asia (Europe in the 1970s; the United States from the late 1980s to the mid-1990s).[5]

In line with increases in opium production reported in South-East Asia in recent years (30 per cent over the period 2010-2015), heroin and morphine seizures related to opiates produced in South-East Asia rose by 88 per cent, from 7.1 to 13.3 tons, over the period 2010-2015. This resulted in an increase in the overall proportion of heroin and morphine seized in countries predominantly supplied by opiates produced in Myanmar from 7 per cent of the global total in 2010 to 15 per cent of the global total in 2015. While the Australian authorities reported that just 26 per cent of the heroin they seized in 2008 had originated in South-East Asia (Myanmar), the proportion rose to 90 per cent in 2014 and 98 per cent over the period January-June 2015.[6] Similarly, the vast majority of the large quantities of heroin seized nowadays in China originates in Myanmar.

5 United States Department of Justice, Drug Enforcement Administration , *2016 National Drug Threat Assessment Summary* (November 2016), p. 47.

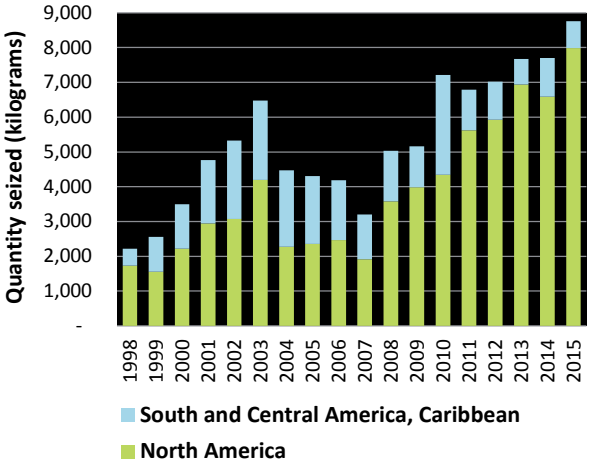
6 Australian Criminal Intelligence Commission, *Illicit Drug Data Report 2014-15* (Canberra, 2016), p. 77.

FIG. 9 Quantities of heroin and morphine seized in countries supplied by opiates produced in South-East Asia, 1998-2015



Source: UNODC, responses to the annual report questionnaire.

FIG. 10 Quantities of heroin and morphine seized in countries supplied by opiates produced in Latin America, 1998-2015



Source: UNODC, responses to the annual report questionnaire.

Seizures of opiates out of Latin America also on the increase

Opium and heroin produced in Latin America, most notably in Mexico, Colombia and Guatemala, is primarily destined for the United States market and, to a lesser extent, for local markets in Latin America. Exports from Latin America to other regions are still the exception; only Ecuador reported some small seizures of heroin in 2015 that were bound for Spain. Heroin seized in Canada originates mostly in South-West Asia.

Reported quantities of heroin and morphine seized in North America increased by over 80 per cent in the last five years, from 4.4 tons in 2010 to 8 tons in 2015. In 2015, the proportion of heroin and morphine seizures linked to Latin American opiate production thus reached 10 per cent of the global total of heroin and morphine seizures. This went hand in hand with a reported heroin epidemic in the United States, where there has been a sharp increase in heroin-related deaths in recent years (booklet 2). According to the Heroin Signature Program of the Drug Enforcement Administration (DEA) of the United States, from the beginning of the new millennium to 2010 the bulk of the heroin in the United States market originated in Colombia, but that proportion subsequently declined as the proportion of heroin originating in Mexico increased, reaching a proportion of 79 per cent of all heroin samples analysed in 2014, with most of the rest originating in Colombia and only 1 per cent in South-West Asia (i.e., Afghanistan).[7] There is, however, still a significant regional difference in the origin of heroin supplied to the United States market: almost all of the heroin found in cities in the western United States is of Mexican origin, while the bulk of heroin found in cities in the eastern United States still originates in South America (mainly Colombia).[8]

The global opiate market appears stable

Affecting some 0.4 per cent of the world population aged 15-64 years — the same proportion as in previous years[9] — the global number of opiate users (i.e., users of opium, morphine and heroin) continued to increase, although marginally, from 17.3 million in 2014 to 17.7 million in 2015.

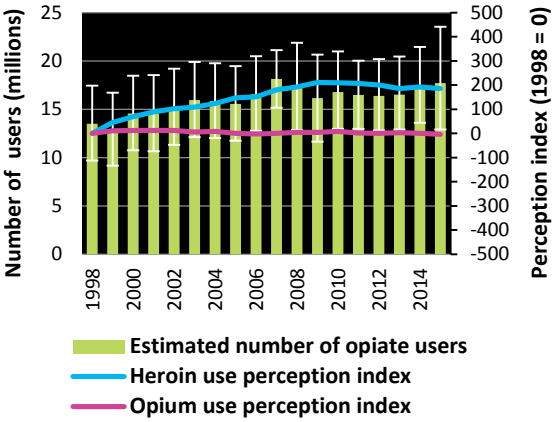
At the global level, expert perceptions suggest that heroin use has been decreasing slightly since 2009, while opium use has remained largely stable.

7 United States Drug Enforcement Administration, *2016 National Drug Threat Assessment Summary*, p. 47.

8 Ibid., p. 48.

9 It must be noted, however, that these data only reflect trends in the parts of the world where data are available.

FIG. 11 Estimated number of global opiate users and opiate use perception index, 1998-2015



Source: UNODC calculations, based on responses to the annual report questionnaire.

Note: For details of the calculation methods, see the online methodology section of the present report.

Differences in subregional trends remain significant, however.

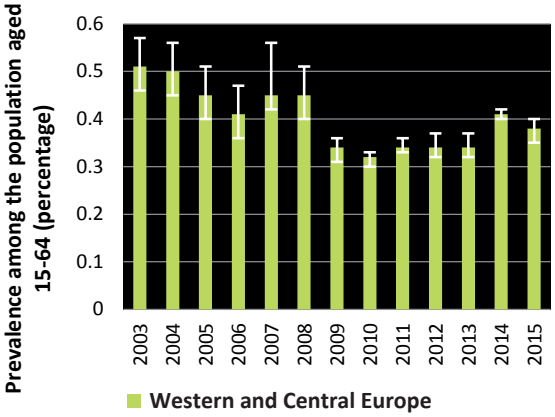
The prevalence of opiate use among the population aged 15-64 years continues to be relatively high in the Near and Middle East/South-West Asia (1.4 per cent), Central Asia (0.9 per cent), Europe (0.6 per cent) and North America (0.5 per cent).

Tentative signs of an expansion of the opiate market in Europe

A number of indicators suggest that the long-term downward trend in opiate use (since the late 1990s) may have come to an end. UNODC estimates of the overall prevalence of opiate use in Europe have shown a marginal upward trend since 2010.[10] Such an increase has been reported most notably in Italy, where the rate of problem drug use related to the use of opioids increased from 0.45 per cent of the population aged 15-64 years in 2012 to 0.52 per cent in 2014, and heroin use, reflected in national household surveys, actually doubled between 2008 and 2014, from 0.4 per cent to 0.8 per cent. There was also a slight increase in Czechia, where the prevalence rate of problem drug use related to the use of opiates rose from 0.13 per cent in 2011 to 0.16 per cent in 2014, and in Cyprus, which reported an increase from 0.11 per cent in 2010 to 0.18 per cent in 2014.[11] In the last few years, increases in opiate use have also been reported by Latvia (2014), Liechtenstein (2014), France (2013) and Estonia (2011). However, at present more countries continue to report decreases than increases in opiate use, and the majority of European countries continue to report overall stable levels of opiate use.

In parallel to the possible increase in opiate use in Europe, there have been some reports of a rising number of deaths involving opiates in recent years. Following a decline in drug-related deaths in Germany, from 2,030 deaths in 2000 to 944 deaths in 2012, which were to a large extent related to the use of opiates, drug-related deaths increased to 1,032 cases in 2014 and 1,226 cases in 2015, which is equivalent to an increase of 30 per cent over the period 2012-2015.[12] Moreover, opioid-related deaths in England and Wales rose by 54 per cent, from 1,290 cases in 2012 to 1,989 in 2015, and deaths linked to heroin and/or morphine actually doubled over the period 2012-2015, from 579 to 1,201 cases.[13]

FIG. 12 Prevalence of problem opiate use in Western and Central Europe, 2003-2015



Sources: UNODC calculations, based on responses to the annual report questionnaire and the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), Statistical Bulletin 2016 and previous years.

10 *World Drug Report 2017* (Booklet 2) and previous years.

11 EMCDDA, Statistical Bulletin 2016, Data and statistics, Problem drug use: Opioids–Trends. Available at www.emcdda.europa.eu/data/stats2016.

12 Germany, Bundeskriminalamt, "Rauschgiftkriminalität: Bundeslagebild 2015" (Wiesbadean, 2015) (and previous years).

13 United Kingdom, Office for National Statistics, "Deaths

Significant increases in the number of deaths have also been reported by Portugal and Romania in recent years. In Portugal, the number of drug-related deaths (mostly attributable to opiates) rose from 19 cases in 2011 to 37 cases in 2014, while they increased from 15 to 36 cases over the same period in Romania,[14] with opioids responsible for the highest proportion of deaths among all drug groups.

The opiate market in North America continues to grow

Heroin use has been increasing for some time in North America, particularly in the United States, as reflected in both national household surveys and in heroin-related deaths. The proportion of heroin-related deaths per 100,000 inhabitants quadrupled between 2010 and 2015, clearly exceeding growth in overall opioid-related deaths, which almost doubled (from 6.8 to 10.4 per 100,000 inhabitants), and all drug-related deaths, which rose by a third over the period 2010-2015 (from 12.9 to 17.2 per 100,000 population).[15]

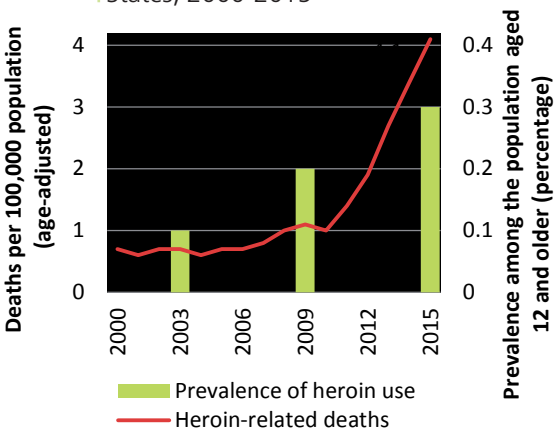
Africa seems to be experiencing some of the sharpest increases in heroin use

Information on the prevalence of opiate use in Africa and in Asia is very limited, making it difficult to identify solid trends; data reported in those regions must be interpreted with caution. Based on trend perceptions reported to UNODC by Member States, heroin use in Africa appears to have increased more than in other regions (followed by the Americas) over the period 2000-2015, reflecting the increasing spillover effect of heroin trafficking along the southern route. Increases in the use of opioids (primarily reflecting heroin use) in 2015 in East Africa were reported by Kenya and the United Republic of Tanzania, in Southern Africa by Mozambique, Zambia (and, in 2012, by South Africa), and in West and Central Africa by Nigeria and Côte d'Ivoire.

In Asia, although heroin use is perceived to have declined slightly since 2010, it still seems to be higher now than in 2000. In 2015, declines in heroin use were perceived to have taken place in some countries in Central Asia and Transcaucasia (Kazakhstan, Kyrgyzstan and Uzbekistan), in South-East Asia (China (including Hong Kong, China) and Indonesia) and in the Near and Middle East (Qatar and the Syrian Arab Republic). In a few countries, however, there were perceived increases in heroin use in 2015, mostly linked to the trafficking of Afghan opiates; those countries included Afghanistan, several of its neighbouring States (Iran (Islamic Republic of), Pakistan and Tajikistan) and one Gulf country (United Arab Emirates), all of which are also used as transhipment locations.

Information for India as a whole is not available, but there are indications of an increasing trend in the use of opioids in the Indian State of Punjab, bordering Pakistan. According to a study conducted in 2015, Punjab, which accounts for 2.2 per cent of India's total population,[16] was reported to have around 860,000 users of opioids (0.5 per cent of

FIG. 13 Annual prevalence of heroin use and heroin-related deaths in the United States, 2000-2015



Source: United States, Substance Abuse and Mental Health Services Administration (SAMHSA), Center for Behavioral Health Statistics and Quality, *Key Substance Use and Mental Health Indicators in the United States: Results from the 2015 National Survey on Drug Use and Health,* HS Publication No. SMA 16-4984, NSDUH Series H-5 (Rockville, Maryland, 2016) and Centers for Disease Control and Prevention, National Center for Health Statistics, Multiple cause of death data. Available at https://wonder.cdc.gov/mcd.html (last reviewed December 2016).

related to drug poisoning in England and Wales: 2015 registrations", Statistical Bulletin (September 2016).

14 UNODC, annual report questionnaire, 2015; EMCDDA, Statistical Bulletin 2016, Data and statistics.

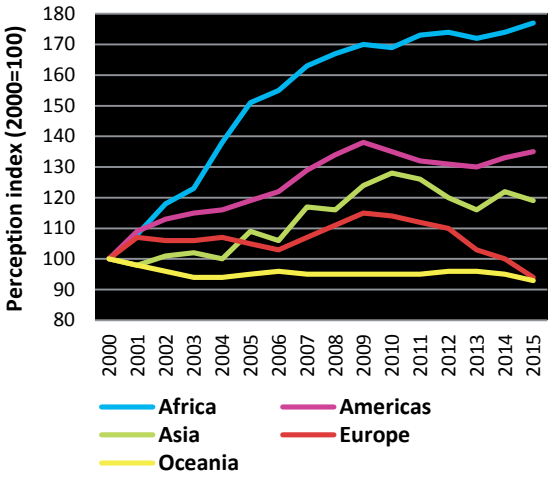
15 For more details, see Booklet 2 of the *World Drug Report 2017*.

16 India, Ministry of Home Affairs, Office of the Registrar General and Census Commissioner, 2011 Census Data, Population. Available at www.censusindia.gov.in/.

the population aged 15-64 years), including 230,000 who were dependent on opioids and nearly 75,000 who injected opioids. The study concluded that the new data for Punjab point to an increase in opioid use since the last national survey in 2001, which estimated that some 500,000 people in India were opioid dependent.[17]

Heroin use in Oceania declined over the period 2000-2015, in line with reports of declines in heroin use in Australia and New Zealand. Latest annual prevalence data for Australia showed a decline in heroin use, from 0.2 per cent of the population aged 14 years and older (heroin use had been at that level ever since the drastic fall following the heroin drought of 2001) to 0.1 per cent in 2013.[18]

FIG. 14 | Heroin use perception index, by region



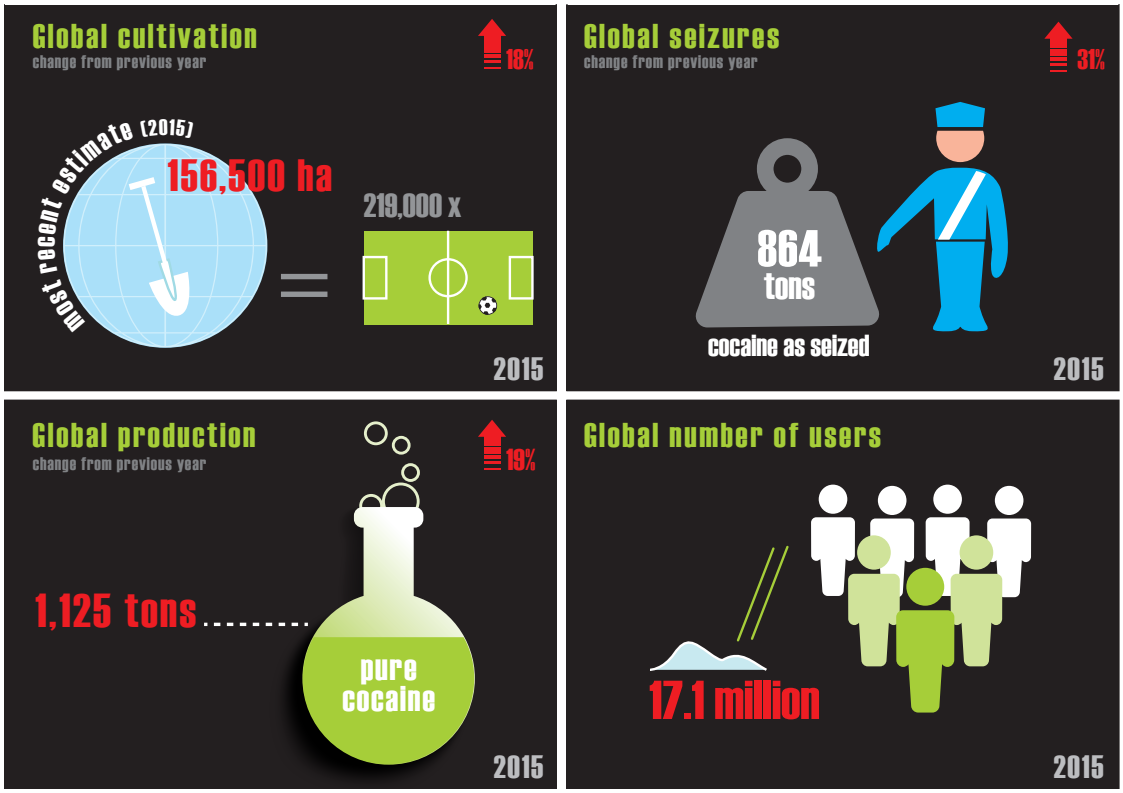
UNODC calculations, based on responses to the annual report questionnaire

Note: For details of the calculation method, see the online methodology section of the present report.

17 India, Society for Promotion of Youth and Masses, National Drug Dependence Treatment Centre and All India Institute of Medical Sciences, "Punjab opioid dependency survey: estimation of the size of opioid dependent population in Punjab", brief report (2015).

18 Australian Institute of Health and Welfare, *2103 National Drug Strategy Household Survey Detailed Report*, Drug statistics series No. 28 (Canberra, 2014).

B. THE COCAINE MARKET



Note: Data refer to 2015. Seizures are of cocaine of varying purity. Estimates of illicit cultivation and eradication of coca bush, manufacture of cocaine and prevalence of cocaine use are available in the annex of booklet 2.

Coca bush cultivation on the increase in the last two years

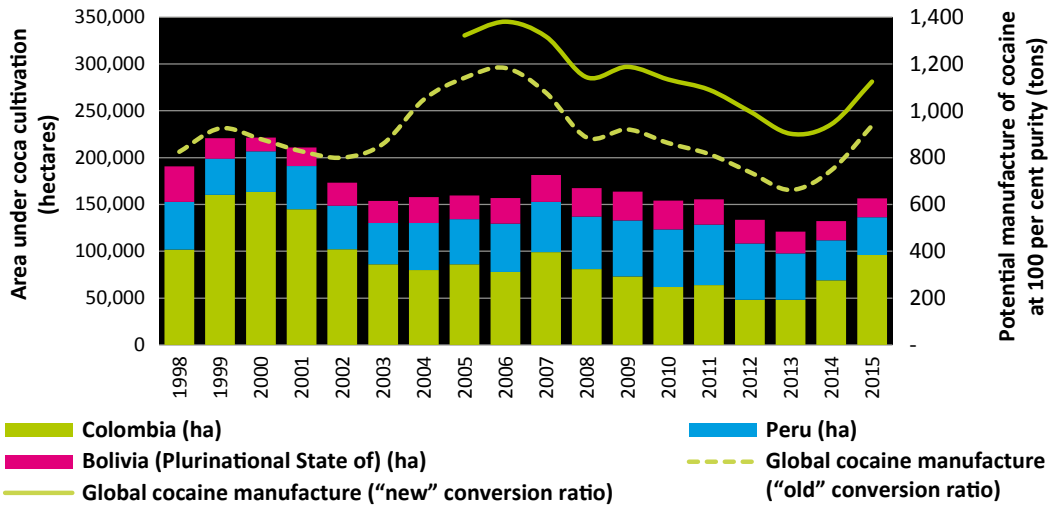
Coca bush cultivation fluctuated within an overall downward trend from its peak in 2000 to 2013. The trend was then reversed, with the total area under coca bush cultivation increasing by 30 per cent over the period 2013-2015, to return to the level reported in 2011. That increase was driven by a doubling of the area under coca bush cultivation in Colombia — by 44 per cent in 2014 and by 39 per cent in 2015, to reach 96,000 ha. This may have been a consequence of different dynamics: a decrease in the perception among farmers of the risk of being affected by eradication (aerial spraying fell by 33 per cent from the previous year to 37,200 ha in 2015, and in October 2015 aerial eradication was completely abandoned by the Colombian Government); local phenomena affecting the licit economy (for example, drought in Antioquia and southern Bolivar in 2015); and higher coca leaf prices. The increase was also related to the peace negotiations that led to expectations among farmers that they would benefit from alternative development and be in a stronger position to negotiate with the authorities if engaged in coca bush cultivation.[19] Nonetheless, coca bush cultivation in Colombia in 2015 was still 41 per cent lower than at its peak in 2000, a consequence of initially strong eradication efforts in combination with improved alternative development activities, particularly after 2007.[20]

In Peru, the area under coca bush cultivation decreased after 2011, dropping to 40,300 ha in 2015, which may have been the result of improved alternative development activities and increased eradication efforts (as reported by the Government).

19 UNODC and Colombia, *Colombia: Coca Cultivation Survey 2016* (July 2016), p. 13 and *Colombia: Coca Cultivation Survey 2014* (July 2015), p. 13.

20 *World Drug Report 2015* (United Nations publications, Sales No. E.15.XI.6), p. 113.

FIG. 15 | Global coca cultivation and cocaine manufacture, 1998-2015



Sources: UNODC, coca cultivation surveys in Bolivia (Plurinational State of), Colombia and Peru, 2014 and previous years.

Such efforts reached a record level of 35,900 ha of eradicated coca bush cultivation in 2015, up from 12,000 ha in 2010.[21] Similarly, in the Plurinational State of Bolivia, coca bush cultivation over the period 2010-2015 fell by 35 per cent, to 20,200 ha, reflecting, inter alia, its "políticas de control social en coordinación con las organizaciones sociales productoras de coca"[22] (policy based on "voluntary" reductions in coca cultivation in the coca-growing areas, limiting cultivation to a maximum of 1 cato per family),[23, 24, 25, 26] which went in parallel with eradication (as reported by the Government), particularly in national parks and other areas outside accepted cultivation areas. Overall, coca bush eradication almost doubled in the Plurinational State of Bolivia, from around 6,000 ha per year over the period 2005-2009 to around 11,000 ha per year over the period 2011-2015.[27]

The total level of cocaine manufacture worldwide is estimated based on the area under cultivation, coca yield estimates and cocaine lab efficiency. The 2015 estimate (expressed at 100 per cent purity) for the three Andean countries, Bolivia (Plurinational State of), Columbia and Peru, increased to 1,125 tons[28] and thus returned to the level seen in 2008. Global cocaine manufacture (based on the new conversion ratios)[29] was 19 per cent higher than in the previous year and 25 per cent higher than in 2013.

21 UNODC and the National Commission for Development and Life without Drugs of Peru, *Perú: Monitoreo de Cultivos de Coca 2015* (July 2016).

22 UNODC and the Plurinational State of Bolivia, *Estado Plurinacional de Bolivia: Monitoreo de Cultivos de Coca 2015* (July 2016).

23 Plurinational State of Bolivia, Ministry of Rural Development, Agriculture and the Environment, "Acuerdo entre el gobierno nacional y los productores de hoja de coca", 14 September 2008.

24 Robert Lessmann, "Bolivien: zwischen Modellfall und Unregierbarkeit", in *Bolivien Staatszerfall als Kollateralschaden*, Thomas Jäger, ed. (Wiesbaden, Germany, VS Verlag für Sozialwissenschaften, 2009), p. 54.

25 One cato is 0.16 ha in Chapare and 0.25 ha in the Yungas region, as farmers in the Yungas argue that the coca plant yield is less in the Yungas than in the Chapare. (Linda C. Farthing and Kathryn Ledebur, *Habeas Coca: Bolivia's Community Coca Control* (New York, Open Society Foundations, July 2015).

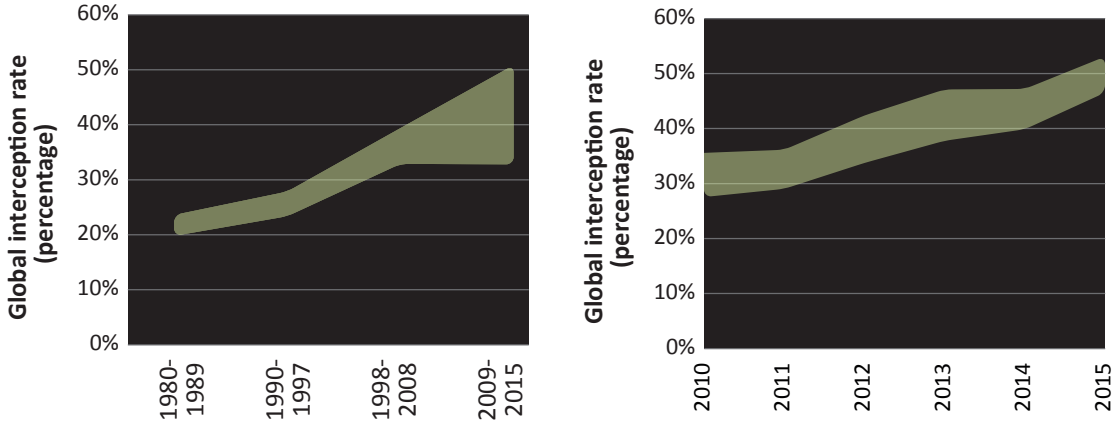
26 Kathryn Ledebur, Coletta A. Youngers, From Conflict to Collaboration: An Innovative Approach to Reducing Coca Cultivation in Bolivia, *Stability: International Journal of Security & Development*, 2(1), (2013).

27 UNODC and the Plurinational State of Bolivia, *Estado Plurinacional de Bolivia: Monitoreo de Cultivos de Coca 2015*, issue of July 2016 and previous years.

28 Based on the new conversion ratios, as discussed in the methodology section of the online version of this report.

29 For more information on the new conversion rations, see the methodology section of the online version of this report.

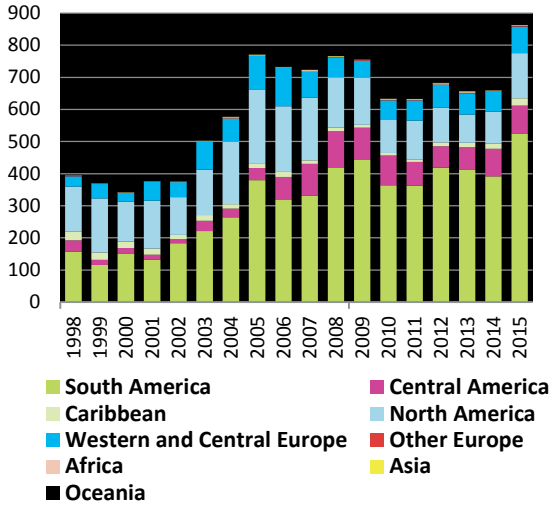
FIG. 16 | Estimated global cocaine interception rates, 1980-2015



Sources: UNODC calculations, based on coca bush cultivation surveys, responses to the annual report questionnaire; and government reports.

Note: Purity adjustment of seizures based on average unweighted purities at the global level. For details of the calculation methods, see the online methodology section of the present report.

FIG. 17 | Global quantities of cocaine seized,[a] by region, 1998-2015



Distribution of seizures in 2015

Oceania: 0.1%
Africa: 0.1%
Asia: 0.2%

Western and Central Europe: 10%
East and South-East Europe: 0.2%

Caribbean: 3%
Central America: 10%
North America: 16%
South America: 61%

[a] *Includes cocaine hydrochloride, coca paste and base, and "crack" cocaine; not adjusted for purity.*

Source: UNODC, responses to the annual report questionnaire.

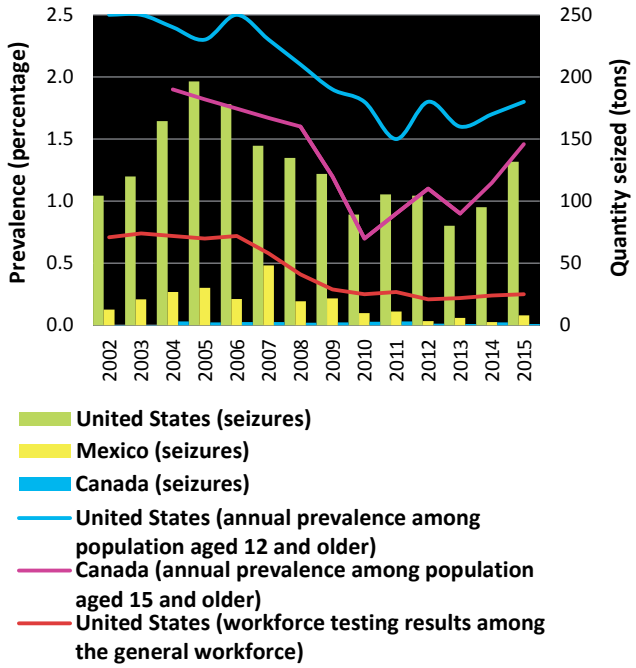
Record cocaine seizures in 2015, trafficked primarily from South America to North America, Western and Central Europe

In 2015, global cocaine seizures rose 32 per cent from the level of the previous year to reach 864 tons (of varying purity), the highest level ever reported. The global interception rate nearly doubled from 20-24 per cent in the 1980s to 34-53 per cent over the period 2009-2015; it reached 40-47 per cent in 2014 and increased to 45-55 per cent in 2015, a record level.

A total of 153 countries from all regions reported cocaine seizures over the period 2010-2015, suggesting that trafficking in cocaine is a global phenomenon. Nevertheless, 90 per cent of the cocaine intercepted in 2015 was in the Americas, most notably in South America, where production and, increasingly, consumption take place; in North America, the main consumer market worldwide; and in the transit regions of Central America and the Caribbean. The next largest portion of total quantities seized was reported in Europe (10 per cent), particularly in Western and Central Europe. Quantities intercepted in Asia, Africa and Oceania accounted for a minor proportion (0.5 per cent of the total).

The largest increases from the previous year in quantities seized were reported in Oceania (63 per cent),

FIG. 18 Quantities of cocaine seized in North America and annual prevalence of cocaine use in the United States and Canada, 2004-2015



Sources: Responses to the annual reports questionnaire data; the United States National Household Survey on Drug Use and Health; Quest Diagnostics, "Quest Diagnostics Drug Testing Index", full year 2015 tables"(September 2016), and previous years; the Canadian Tobacco, Alcohol and Drugs Survey (CTADS) 2015 and, for previous years, Health Canada, Canadian Alcohol and Drug Monitoring Surveys (CADUM).

the Caribbean (51 per cent), North America (40 per cent) and Europe (35 per cent) in 2015.

Global figures on cocaine use mask important regional patterns and trends

At the global level, cocaine use in terms of annual prevalence has remained stable in recent years, at around 0.4 per cent of the population aged 15-64 years, although levels differ substantially among the subregions. The highest annual prevalence rates in 2015 were reported in North America (1.8 per cent), Oceania (1.5 per cent) and Western and Central Europe (1.1 per cent). The largest number of cocaine users worldwide was found in North America (33 per cent of the global total), followed by Western and Central Europe (20 per cent) and South America, together with the Caribbean and Central America (17 per cent).

Changes in the North American cocaine market

North America, the world's largest cocaine market, has shown an upward trend in the last few years following a sharp decline between 2006 and 2012. Several indicators document the decrease and subsequent increase in cocaine use in the United States, including use in the general population and in the workforce. Similarly, data from Canada signalled strong declines in cocaine use in the second half of the first decade of the new millennium, followed by a subsequent increase, most of which occurred between 2013 and 2015.[30] Those declines and subsequent increases in cocaine use are thought to be at least partly the result of changes in cocaine manufacture in Colombia, which fell by 50 per cent over the period 2006-2012 (from 660 tons to 333 tons), before almost doubling again (to 646 tons) in 2015.[31] As a result, the availability of cocaine in the United States was reported to have increased in 2015.[32]

This development is reflected in the quantities of cocaine seizures reported in North America, which fell by more than 50 per cent, from 202 tons in 2006 to 87 tons in 2013, before rebounding to 141 tons in 2015. Accounting for 93 per cent of all quantities of cocaine seized in North America, the largest cocaine seizures in North America in 2015 were reported by the United States, followed by Mexico (6 per cent) and Canada (1 per cent).

Cocaine trafficking to the United States

As in previous years, the vast majority (90 per cent in 2015) of the cocaine trafficked to the United States originated in Colombia, while around 7 per cent of the coca leaf used in the manufacture of the cocaine found in the United States market appeared to have originated in Peru. However, forensic analysis indicated that less than 1 per cent of the cocaine samples in the United States market could be linked to cocaine hydrochloride actually manufactured in Peru: most of the samples trafficked

30 Health Canada and Statistics Canada, Canadian Tobacco, Alcohol and Drugs Survey: 2015 summary.

31 UNODC, *Colombia: Coca Cultivation Survey 2015*, p. 11; and issues of previous years.

32 United States Drug Enforcement Administration, *2016 National Drug Threat Assessment Summary*, p. 87.

as cocaine from Peru showed chemical signatures consistent with those of cocaine hydrochloride produced in laboratories controlled by Colombian organized crime groups.[33] This suggests that either some of the coca paste or cocaine base produced in Peru may be subsequently transformed into cocaine hydrochloride in Colombia before being shipped to the United States. It could also mean that Colombian controlled laboratories operating in other countries in the subregion, and using the same chemicals and production methods as in Colombia, were processing Peruvian coca paste and cocaine base into cocaine hydrochloride.

DEA estimates suggest that 76 per cent of the cocaine departing South America transited the eastern Pacific in 2015, often by ship or semi-submersible vessel, entering either Central America or Mexico before being transported overland to the United States. It then entered the country via major hub cities located in Arizona, California and Texas before being transported along interstate highways to various other hub cities, including Atlanta, Chicago and New York. Smaller amounts were transshipped through the western and eastern Caribbean (14 and 9 per cent, respectively), often using "go-fast" vessels and, to a lesser extent, aircraft. While cocaine transported across the western Caribbean typically transits Mexico before entering the United States, cocaine shipped across the eastern Caribbean mainly enters the United States mainland via Puerto Rico and the Dominican Republic before reaching Miami or New York. The trafficking of cocaine via both the eastern Pacific and the Caribbean was reported to have increased in 2015.[34]

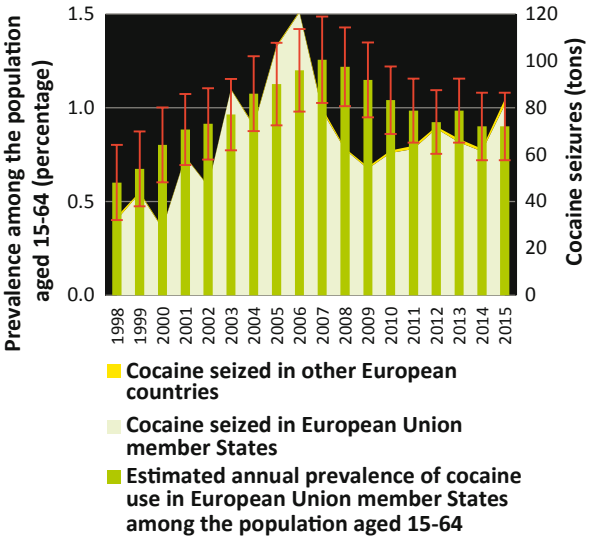
Early signs of growth in the European cocaine market

Cocaine seizures in Europe declined from a peak in 2006 before starting to recover again over the period 2009-2015. The supply of cocaine to Europe, prompted by production declines in Colombia, decreased after 2006 before recovering after 2009 as traffickers started to make use of alternative sources from Peru and, to a lesser extent, the Plurinational State of Bolivia in order to offset the shortfall in supply from Colombia. In recent years,

33 Ibid., p. 90.

34 Ibid., pp. 96-98.

FIG. 19 Quantities of cocaine seized in Europe and annual prevalence of cocaine use in the European Union, 1998-2015



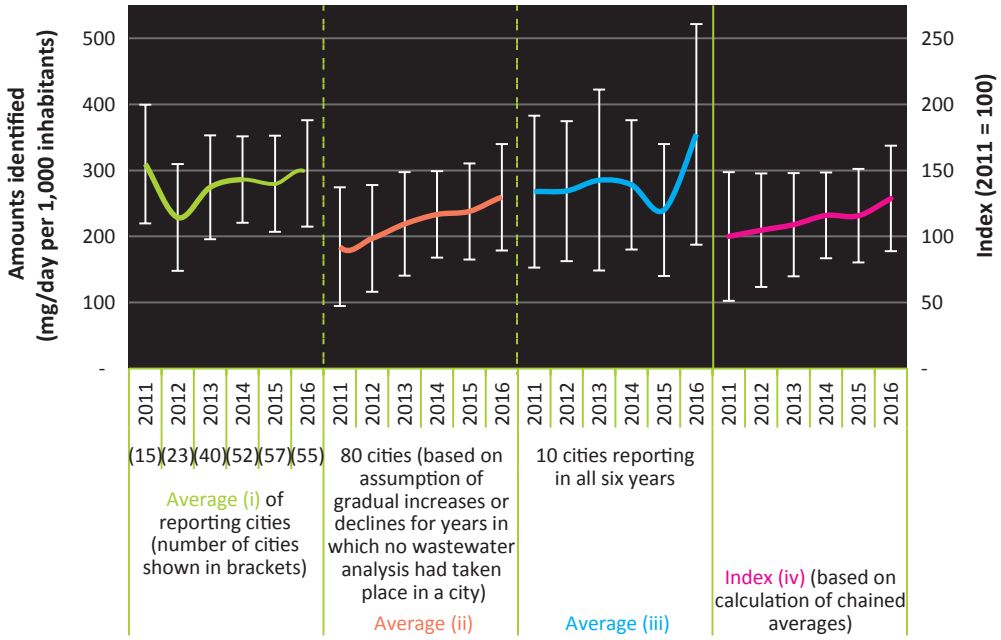
Sources: UNODC calculations based on responses to the UNODC annual report questionnaire; and EMCDDA, Statistical bulletin 2016 and previous years.

however, Colombia, in line with large increases in cocaine manufacture in the past two years, appears to have re-emerged as the main supplier to Europe.

Overall supply of cocaine to Europe thus appears to be increasing again. However, data on cocaine use in the European Union, so far, only partially follow that trend. The overall prevalence of cocaine use in the European Union appears to have declined from a peak of around 1.3 per cent of the population aged 15-64 years (about half the rate reported in the United States) in 2007, before stabilizing, and affecting around 0.9 per cent of the population aged 15-64 years over the period 2011-2015.

Data on cocaine use in individual countries across Europe continue to show a mixed picture with no clear overall trends emerging. Some countries with a high prevalence of cocaine use, such as the United Kingdom, Spain and Italy (by order of prevalence), as well as other countries in Western and Central Europe, including Germany, Austria, Denmark, Belgium, Czechia, Slovakia and Poland (by order of prevalence), have reported declines in recent years. However, cocaine use appears to have increased in a number of other countries in the subregion, including the Netherlands, France and Switzerland,

FIG. 20 | Benzoylecgonine (cocaine metabolite) found in wastewater per 1,000 inhabitants in Europe (based on data from 80 European cities), 2011-2016



Source: Calculations based on Sewage Analysis CORE Group Europe (SCORE).

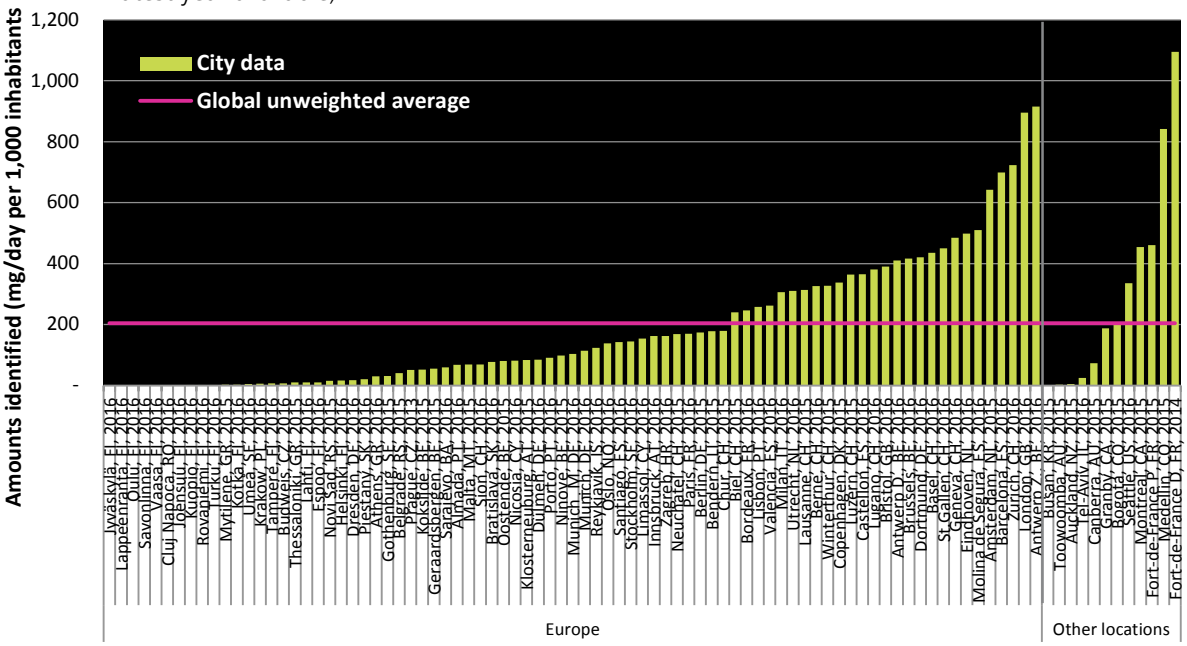
Note: The wastewater analysis took place in 26 countries over the period 2011-2016. All city results have been weighted by the population served by the respective drug treatment plants. The analysis in each city was based on the amounts of benzoylecgonine identified in wastewater over a seven-day period, which allowed for the calculation of a daily average of benzoylecgonine per 1,000 inhabitants living in the area served by the respective wastewater treatment plant. For details of the calculation methods, see the online methodology section of the present report.

and some of the countries in South-Eastern Europe (Croatia and Romania). Overall, nine European countries perceived stable levels of cocaine use in 2015, five perceived a decline, and five perceived an increase in the number of cocaine users, with large increases in 2015 being reported by Portugal and Romania.

The analysis of benzoylecgonine (a cocaine metabolite) in wastewater, which can provide information about trends in cocaine consumption (i.e., tons consumed), shows a somewhat different picture. Based on data from 80 cities (accounting for 7 per cent of the population in the 26 participating European countries), results point to an increase in cocaine consumption since 2011, by some 30 per cent or more, depending on the methodology used. This is in line with quantities of cocaine seized that show an increase of more than 30 per cent over the period 2011-2015 in Europe. In 2016, levels of benzoylecgonine found in wastewater turned out to be higher in 32 cities than in the previous year and lower in 8 cities. When the average for all the cities is used, cocaine consumption appears to have remained stable, although this is primarily the result of the wider coverage of surveillance sites over the years.

The analysis at the city level shows high values of benzoylecgonine in wastewater per 1,000 inhabitants in Antwerp, London, Zurich, Barcelona and Amsterdam, as well as in other cities in Switzerland, the Netherlands, Germany, Belgium, Spain, Denmark and Italy (by level of benzoylecgonine). Differences within countries can, however, be large, as reflected in the high level of benzoylecgonine found in Dortmund, in western Germany, and the low level found in Dresden, in the east of the country. Levels too low to be detectable were reported in some cities in Finland and Romania, while low levels were found in some cities in Greece, Poland and Sweden.

FIG. 21 Benzoylecgonine (cocaine metabolite) found in wastewater per 1,000 inhabitants, 2016 (or latest year available)



Source: Sewage Analysis CORE Group Europe (SCORE).

The level of benzoylecgonine per 1,000 inhabitants reported in Fort-de-France, Martinique, the French department located in the Caribbean, was far higher than in Europe. The same was the case in Medellin, Colombia, which is located near some of the world's largest clandestine cocaine manufacture centres, and where the level of cocaine detected in wastewater exceeded the level found in the capital, Bogota. Benzoylecgonine levels identified in both Montreal, Canada, and in Seattle, United States, also turned out to be higher than both the European and the global averages. By contrast, no benzoylecgonine was detected in wastewater in Busan, Republic of Korea, or in Auckland, New Zealand.

Trafficking of cocaine

Trafficking of cocaine to Europe

Among the main coca-producing countries, the main country of origin/departure of seized cocaine shipments to Europe continues to be Colombia, which accounted for 43 per cent of reports by European countries in the annual report questionnaire over the period 2010-2015, followed by Peru (33 per cent) and the Plurinational State of Bolivia (23 per cent). When data analysis is limited to 2015, the proportion of reports citing Colombia increases to 67 per cent, which tallies with the increase in cocaine manufacture reported by Colombia and the largely stable levels of cocaine production in the other two countries.

The single most frequently mentioned non-European country of departure of shipments of cocaine to Europe over the period 2010-2015 was Brazil, followed by Colombia, Peru, Ecuador, the Dominican Republic, Argentina and the Bolivarian Republic of Venezuela. The main points of entry of cocaine into Europe have for many years been the countries of the Iberian Peninsula, as well as the ports of Rotterdam, Netherlands, and Antwerp, Belgium.[35] Spain and the Netherlands were also the two main European countries of departure and transit of cocaine identified by European countries over the period 2010-2015, highlighting their role as trafficking and distribution hubs for cocaine in the region.[36] Spain has remained the European country seizing the largest amounts of cocaine over the past two decades, accounting for a third of the

35 Drugs Monitoring Platform, cocaine seizures reported from 1 January 2010-31 December 2015.

36 UNODC, annual report questionnaire data.

Estimating the size of the European cocaine market based on wastewater analysis

The analysis of wastewater in 80 European cities in 2016 (or latest year available), covering a population of some 37 million people, the equivalent of around 7 per cent of the total population of the countries where the analyses took place (504 million people), suggests that an average of 259 mg of benzoylecgonine per 1,000 inhabitants per day was found in wastewater in those cities (95 per cent confidence interval: 179-340 mg).[a]

Using such per capita figures for the European Union, countries of the European Free Trade Association and Balkan countries not members of the European Union (with a total population of 538 million people) and the multipliers (correction factors) found in the literature, to convert benzoylecgonine found in wastewater into cocaine consumption equivalents (a ratio of between 2.3 and 3.59),[b] cocaine consumption in Europe may have ranged from 117 tons of pure cocaine to 183 tons (depending on the correction factors found in the literature) per year in 2016. When taking into consideration the 95 per cent confidence intervals of per capita use of benzoylecgonine, the range increases to 81-240 tons for 2016.

An important caveat is that the cities were not randomly selected. As most of the cities are in Western Europe, where cocaine use is relatively high (and bearing in mind that cocaine use is still more of an urban phenomenon than a rural one), the application of ex-post stratifications with regard to the location of the cities suggests that this estimate needs to be adjusted downwards. Given the information currently available, it appears likely that, based on wastewater data, actual cocaine consumption in the European Union, countries of the European Free Trade Association and Balkan countries not members of the European Union falls somewhere within a broad range of 64–208 tons. (For more details, see the online methodology section of this report.)

a UNODC calculations based on the Sewage Analysis CORE Group Europe.

b EMCDDA, Assessing Illicit Drugs in Wastewater: Advances in Wastewater-based Drug Epidemiology, Sara Castiglioni, ed., Insights Series No. 22 (Luxembourg, Publications Office of the European Union, 2016), pp. 37-39.

total quantity intercepted in the region over the period 2010-2015, followed by Belgium and the Netherlands.

Increasing trafficking in South America linked to growing Colombian cocaine production

Some of the most striking increases in cocaine seizures worldwide over the period 2010-2015 were reported in South America, where seizures rose from 364 tons in 2010 and 392 tons in 2014 to 526 tons in 2015, a rise of 34 per cent from the previous year. This rise can be linked to increased cocaine production in Colombia and increasing trafficking activities out of Colombia. A sharp increase in quantities of cocaine seized in 2015 was reported by Colombia, Venezuela (Bolivarian Republic of), Ecuador, Suriname and Guyana (58 per cent overall from the previous year). Colombia again reported the largest quantities of cocaine seized worldwide in 2015 (34 per cent of the global total) and accounted for 57 per cent of all cocaine seized in South America, followed by Ecuador (12 per cent) and the Bolivarian Republic of Venezuela (12 per cent). This suggests that more than 80 per cent of cocaine seizures made in South America were linked to cocaine produced in Colombia. By contrast, the countries mostly affected by the trafficking of Peruvian and Bolivian cocaine in 2015, including Argentina, Bolivia (Plurinational State of), Brazil, Chile, Peru and Uruguay, reported an overall decrease of 21 per cent in the quantity of cocaine seized, compared with the previous year.

Identified by countries in the Americas over the period 2010-2015, the main cocaine destination country in North America was the United States, followed by Mexico and Canada; in South America, it was Brazil. In Europe, the main destination countries, by number of reports, were Spain, Italy, the Netherlands, Belgium and the United Kingdom.

Cocaine trafficking stable via Central America while increasing via the Caribbean

Based on seizures, cocaine trafficking via Central America appears to have remained relatively stable in 2015, when a total of 86 tons of cocaine were

seized, roughly the same quantity as in the previous year and down slightly from the quantity seized in 2010 (93 tons). The largest quantity seized in 2015 was reported by Panama (53 tons or 62 per cent of all cocaine seized in Central America), followed by Costa Rica (20 per cent) and Guatemala (7 per cent). In 2015, the quantity of cocaine seized in Panama (all from Colombia) increased by more than 50 per cent from the previous year.

In the Caribbean, the quantity of cocaine seized rose from 8 tons in 2010 to 15 tons in 2014 and 23 tons in 2015, with most seizures being reported by Puerto Rico, followed by the Dominican Republic. Cocaine arriving in Puerto Rico is almost exclusively destined for the United States mainland, often entering the country via Florida, [37] while cocaine transiting the Dominican Republic is destined for the United States and Canada, as well as Europe, with Belgium, Italy, Spain and Switzerland reporting the Dominican Republic to be a significant transit country for cocaine trafficking.

Limited Information on cocaine trafficking via Africa

Reflecting the rapidly growing importance of Africa, particularly West Africa, as a transit area for cocaine trafficking, the total quantity of seized cocaine reported by countries in Africa increased from 0.8 tons in 1998 to 5.5 tons in 2007, before falling to 3.4 tons in 2010 and 1.2 tons in 2015. Among the non-European transit countries for cocaine mentioned in the replies to the annual report questionnaire, countries in Africa accounted for 9 per cent over the period 2010-2015, mostly West Africa, and a further 3 per cent concerned countries in the Gulf region. The decline in quantities of cocaine intercepted in Africa in recent years has gone in parallel with a decrease in the number of reports in Europe of African countries being used as transit areas. This trend may, however, be the result of a poor capacity of detection and reporting rather than a decrease in the flow of cocaine, as reflected in some significant seizures of cocaine shipments destined for Africa. For example, in March 2015, the Bolivian authorities seized 5.9 tons of cocaine that would have been destined for West Africa (Ghana and Burkina Faso). More recently, in January 2016, the Bolivian authorities reported the seizure of 8 tons of cocaine (within a shipment of 80 tons of barium sulphate) destined for West Africa (Côte d'Ivoire) via Argentina and Uruguay. In January 2017, Djibouti authorities reported the seizure of 0.5 tons of cocaine from a container on route from Brazil to Spain, its final destination. This was the single largest cocaine seizure in East Africa since 2004, when 1.1 tons of cocaine were seized in Kenya.

African countries report Brazil (58 per cent) as the most frequent departure/transit country for cocaine trafficked to Africa in the period 2010-2015, followed by Colombia (20 per cent), Chile (10 per cent) and Peru (8 per cent). As for countries in the same region, they report Nigeria as the most frequent transit country in Africa, followed by South Africa, Ghana, Mali and the Niger. Cocaine transiting Africa over the period 2010-2015 was reported to be destined mainly for countries in Europe (80 per cent; notably Italy, Spain, France, the United Kingdom and the Netherlands), followed by destinations in North America (15 per cent; mainly the United States) and Asia (4 per cent; China and Malaysia).

Most of the cocaine seized in Africa over the period 2010-2015 was intercepted in West and Central Africa (83 per cent), while 11 per cent was intercepted in North Africa. The largest seizures were reported by Cabo Verde, followed by the Gambia, Nigeria, Chad and Ghana, which are all located in West and Central Africa.

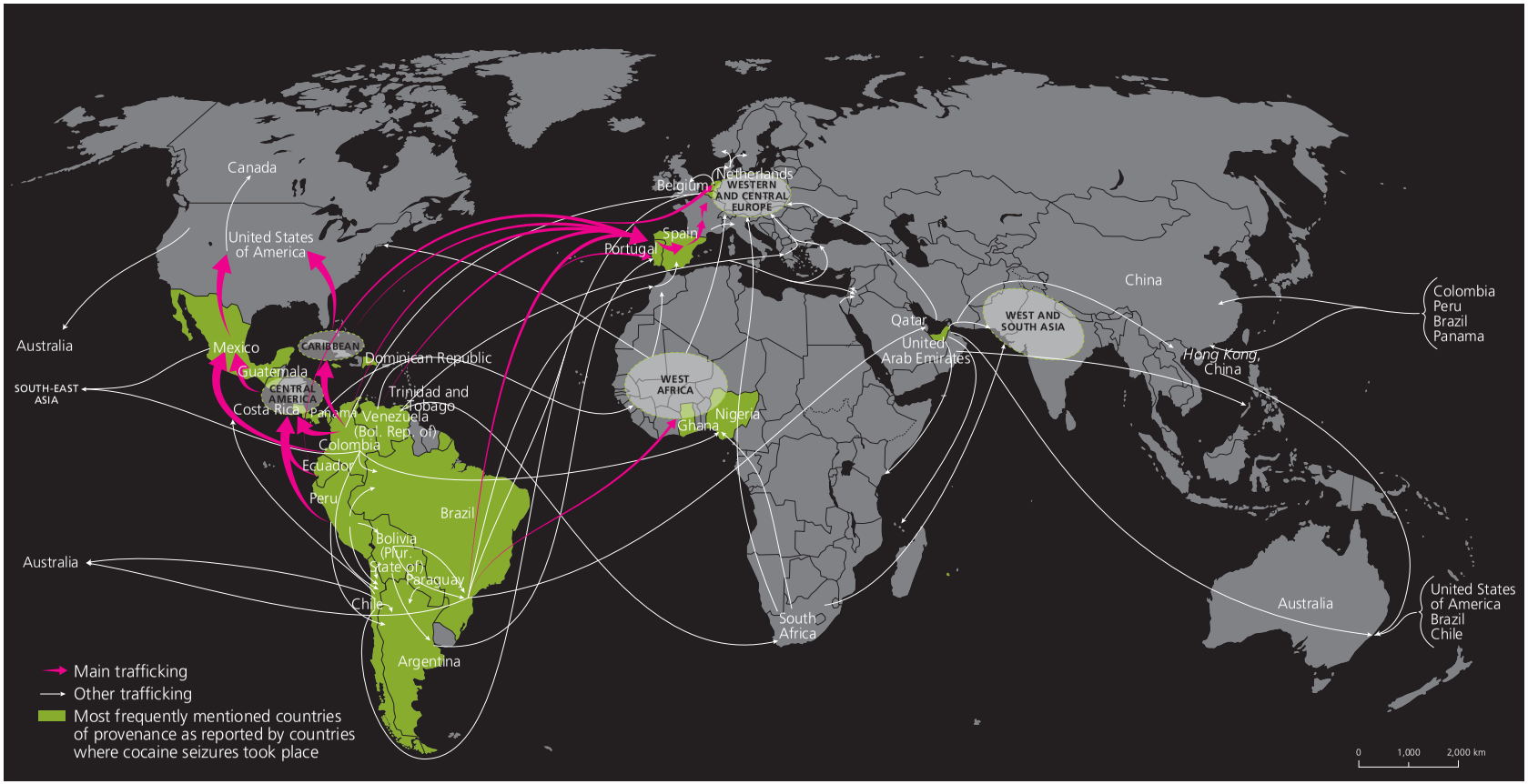
Signs of increase in the trafficking of cocaine to Asia

Cocaine seizures in Asia increased from 0.4 tons in 1998 to 1.2 tons in 2014 and 1.7 tons in 2015. Overall, in 2015, quantities of cocaine intercepted in Asia increased by more than 40 per cent from the previous year, with increases reported in all subregions. Although still comparatively small overall, there are indications that cocaine consumption among the upper socioeconomic groups in several Asian countries continues to rise.[38]

37 United States Drug Enforcement Administration, *2016 National Drug Threat Assessment Summary*.

38 UNODC annual report questionnaire data; Tim Lindsey and Pip Nicholson, *Drugs Law and Legal Practice in Southeast Asia: Indonesia, Singapore and Vietnam*, (Oxford, Hart Publishing Ltd, July 2016); Sania Farooqui, "India becomes

MAP 2 | Main cocaine trafficking flows, 2011-2015



Source: UNODC elaboration, based on responses to annual report questionnaire and individual drug seizure database.

Notes: The trafficking flows are determined on the basis of country of origin/departure, transit and destination of seized drugs as reported by Member States in the annual report questionnaire and individual drug seizure database: as such, they are to be considered as broadly indicative of existing trafficking routes while several secondary flows may not be reflected. Flow arrows represent the direction of trafficking: origins of the arrows indicate either the area of manufacture or the one of last provenance, end points of arrows indicate either the area of consumption or the one of next destination of trafficking.

The boundaries shown on this map do not imply official endorsement or acceptance by the United Nations. Dashed lines represent undetermined boundaries. The dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties. The final boundary between the Sudan and South Sudan has not yet been determined. A dispute exists between the Governments of Argentina and the United Kingdom of Great Britain and Northern Ireland concerning sovereignty over the Falkland Islands (Malvinas).

The largest cocaine seizures in Asia over the period 2010-2015 were made in East and South-East Asia (56 per cent) and in the Near and Middle East/South-West Asia (40 per cent). More recently, in two individual cases, 0.2 tons of cocaine was seized from a container shipped from Brazil (November 2016) and 0.9 tons, being shipped from Ecuador to India (December 2016), were seized in Sri Lanka. A number of smaller cocaine seizures were made in various locations in India, in Pakistan, in Hong Kong, China, Shenzhen, China, Taiwan Province of China, and Lebanon in 2016.

Among all Latin American countries, Brazil was the most frequently reported as the country of departure/transit of cocaine shipments to Asia over the period 2010-2015 (37 per cent), followed by Colombia (19 per cent), Peru (10 per cent), the Plurinational State of Bolivia (10 per cent), Mexico (8 per cent) and Argentina (8 per cent). Many of those shipments transited Africa, mainly through Nigeria and South Africa, while, in Asia, transit through the Near and Middle East (United Arab Emirates, followed by Jordan, Lebanon and the Syrian Arab Republic) and South and South-East Asia (Thailand; Hong Kong, China; and India) were most frequently reported. Cocaine shipments to Asia were mostly reported as being destined for Israel, Lebanon, China and Indonesia (by number of reports).

Cocaine market in Oceania potentially growing again

Cocaine seizures in Oceania increased from around 0.1 tons in the late 1990s to 1.9 tons in 2010, before falling to 0.8 tons in 2014, then recovering to 1.2 tons in 2015. Australia accounted for 99 per cent of cocaine seized in Oceania over the period 1998-2015, including in 2015. The largest quantity of cocaine was seized in New South Wales, with Sydney remaining the main entry point of cocaine into the country[39] and the location with the highest level of cocaine consumption (almost seven times the national average based on wastewater analysis).[40]

Annual prevalence of cocaine use among the general population aged 14 years and older in Australia doubled from 1 per cent in 2004 to 2.1 per cent in 2010 and remained at that level in 2013 — a very high level by global standards: five times the global average and twice that in the European Union. Moreover, there are indications that cocaine consumption might have increased in Australia over the period 2013-2015, based on the median number of days "ecstasy" users and injecting drug users consumed cocaine, the number of cocaine-related arrests, the proportion of detainees having used cocaine and wastewater analysis.[41] Cocaine prices were reported to have declined slightly in the reporting year 2014/15, to 185,000–240,000 Australian dollars per kilogram, while cocaine purity increased slightly, suggesting that cocaine availability may have increased.[42]

Nevertheless, actual consumption of cocaine (the quantity consumed), as opposed to the prevalence of cocaine use (number of users) seems to be still quite limited in both Australia and New Zealand. This may be due to the very high price of cocaine in that part of the world.[43] The demand for treatment for cocaine use continues to be low despite high rates of prevalence of use. This pattern is also reflected in wastewater analysis: while the annual prevalence of cocaine use in Australia is around twice that in the European Union, wastewater data in Australia suggest that actual cocaine consumption per 1,000 inhabitants is clearly below the average for the European Union.[44]

cocaine trafficking centre as drugs follow rise of rich", *The Guardian* (London), 1 October 2015; Bryan Harris "Mexican cartel smuggling cocaine into Hong Kong amid booming demand for drugs", *South China Morning Post* (Hong Kong), 2 February 2014.

39 Australian Criminal Intelligence Commission, *Illicit Drug Data Report 2014-15*, pp. 89-101.

40 Australian Criminal Intelligence Commission, University of Queensland and University of South Australia, *National Wastewater Drug Monitoring Program*, Report No. 1 (Canberra, March 2017), p. 36.

41 Australian Criminal Intelligence Commission, *Illicit Drug Data Report 2014-15*, p. 97.

42 Ibid., pp. 96-98.

43 UNODC annual report questionnaire data, and Australian Criminal Intelligence Commission, *Illicit Drug Data Report 2014-15*.

44 Australian Criminal Intelligence Commission, the University of Queensland and University of South Australia, *National Wastewater Drug Monitoring Program*, Report 1, March 2017, p. 42.

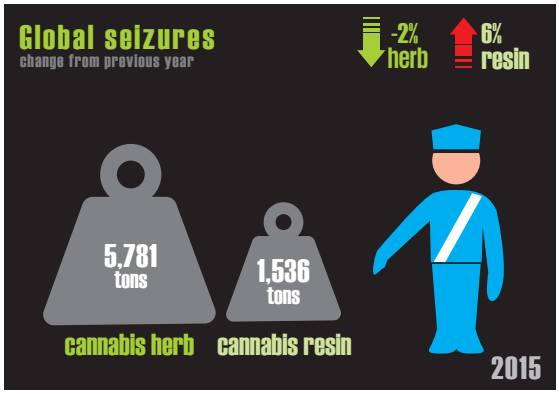
Forensic analysis of cocaine intercepted in Australia revealed that in 2015 most of the cocaine in the Australian market continued to originate in Colombia. The origin of 49 per cent of the cocaine seized by the Australian Federal Police was reported to be Colombia, while 40 per cent was of Peruvian origin, compared with, respectively, 69 per cent and 21 per cent in cocaine seizures reported by custom authorities.[45]

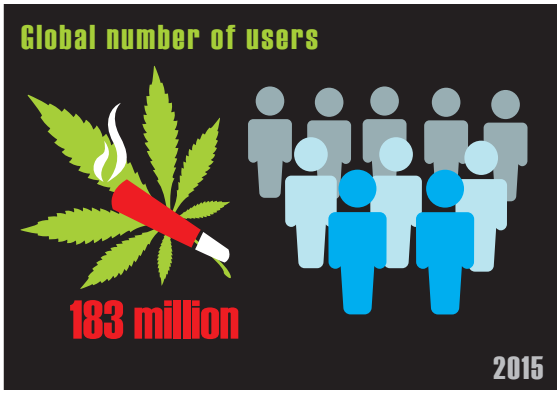
The most frequently reported departure/transit countries in the Americas for cocaine shipped to Oceania in the period 2010-2015 were (in order of importance) the United States, Canada, Chile, Brazil, Peru, Colombia, Argentina, Panama and Mexico; in Asia, they were Hong Kong, China; mainland China; and Thailand. In the reporting year 2014/15, the Australian authorities reported as key embarkation points, in terms of quantities of cocaine seized, the United States, followed by Brazil; Hong Kong, China; Malaysia; the United Arab Emirates; Trinidad and Tobago; France; India; and Thailand.[46]

45 Australian Criminal Intelligence Commission, *Illicit Drug Data Report 2014-15*, Canberra 2016, p. 93.

46 Ibid., p. 91.

C. THE CANNABIS MARKET





Note: Data refer to 2015. Estimates of illicit cultivation, production and eradication of cannabis and prevalence of cannabis use are available in the annex of booklet 2.

Cannabis production remains a global phenomenon

Cannabis plant cultivation — either through direct indicators (cultivation or eradication of cannabis plants) or indirect indicators (seizures of cannabis plants, domestic cannabis production being indicated as the source of seizures, etc.) — was reported on the territory of 135 countries in the period 2010-2015, covering 92 per cent of the world population. Given the absence of systematic measurements, however, the extent and trends in cannabis cultivation and production are difficult to assess. Most indirect indicators come from law enforcement authorities and, to a certain extent, reflect their priorities and resources.[47]

Morocco remains the country most reported by Member States as the source of cannabis resin, followed by Afghanistan and, to a lesser extent, Lebanon, India and Pakistan. In contrast to trafficking in cannabis resin, which is not only intraregional but also interregional (notably, trafficking from North Africa to Europe), trafficking in cannabis herb continues to be largely intraregional. Thus, it is more useful to identify the countries most frequently reported at the regional level as countries of origin over the period 2010-2015 (see box).

47 For more details, see *World Drug Report 2015*, box on "Interpreting drug seizures", p. 27.

Countries most frequently reported as countries of origin of cannabis herb, by region/subregion, 2010-2015

- The most often reported source country for transnational shipments in North America was Mexico, followed by Canada. Although this does not mean that Mexico is the largest producer of cannabis in North America. Significant amounts of cannabis herb are produced in the United States, though mostly for domestic consumption and not for export.
- In South America, the Caribbean and Central America, the most frequently reported source countries of cannabis herb were Colombia and Paraguay, followed by Jamaica.
- In Africa, the most frequently reported source countries were Nigeria, Mozambique, Ghana and Swaziland, although it is difficult to identify specific countries in Africa, because a number of other countries were also reported.
- In Asia, the most frequently identified source country was Afghanistan, followed by Kyrgyzstan, Myanmar, the Lao People's Democratic Republic, Lebanon, India and Nepal.
- In Europe, the two most frequently mentioned source countries for cross-border trafficking of cannabis herb were the Netherlands and Albania.

Source: UNODC, based on responses to the annual report questionnaire.

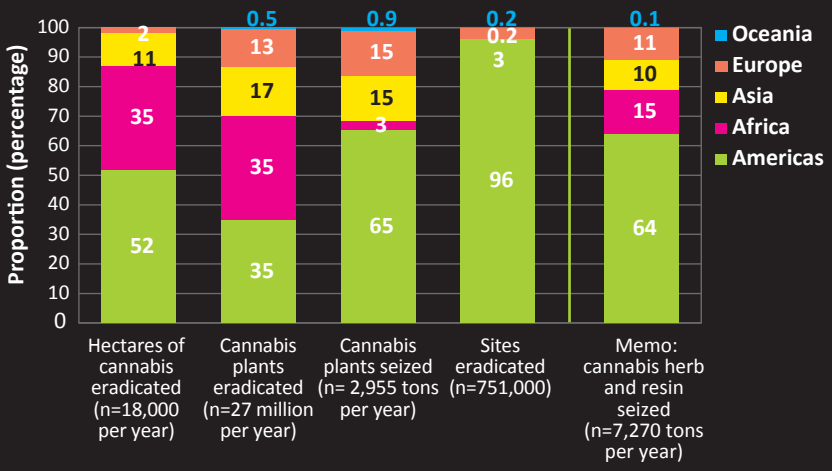
Eradication as an indicator of cannabis production

Measuring the extent of eradication is challenging because some countries report eradication in terms of hectares, while others report in terms of numbers of cannabis plants eradicated, weight of cannabis plants seized or number of cannabis cultivation sites eradicated. This makes comparisons of eradication difficult.

The largest areas of eradicated cannabis cultivation over the period 2010-2015 were reported by Mexico, followed by Morocco and Nigeria. The largest numbers of cannabis cultivation sites eradicated were reported by the United States, followed by Ukraine, the Netherlands and the Russian Federation. The largest numbers of cannabis plants eradicated were reported by Nigeria, followed by the United States, the Philippines and Paraguay. Finally, the largest quantities of cannabis plants seized were reported by Bolivia (Plurinational State of) and Peru, followed by Jamaica.

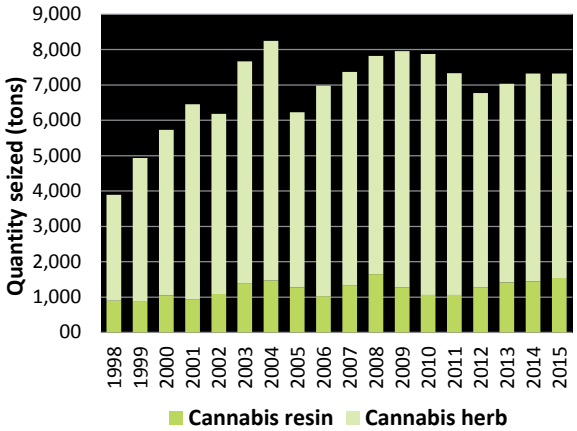
The combination of the various indicators suggests that the world's largest areas of cannabis cultivation subjected to eradication over the period 2010-2015 were located in the Americas. This may indicate the global predominance of that region in cannabis cultivation, but may also point to the extent to which law enforcement authorities have been prioritizing the eradication of cannabis cultivation, which could also have played a role. The second largest area of cannabis cultivation eradicated was in Africa, followed by Asia and Europe, then Oceania. The average distribution of cannabis eradication turns out to be quite similar to that of overall cannabis herb and resin seizures reported at the global level over the period 2010-2015. Patterns of cultivation may differ from patterns of law enforcement operations targeting cannabis cultivation; in Africa, in particular, where law enforcement capabilities are quite modest, the importance of cannabis cultivation may be greater than that indicated by the extent of eradication and seizures.

Available indicators of the distribution of eradication of cannabis production, by region, 2010-2015



Source: UNODC calculations, based on responses to the annual report questionnaire.

FIG. 22 | Global quantities of cannabis resin and herb seized, 1998-2015

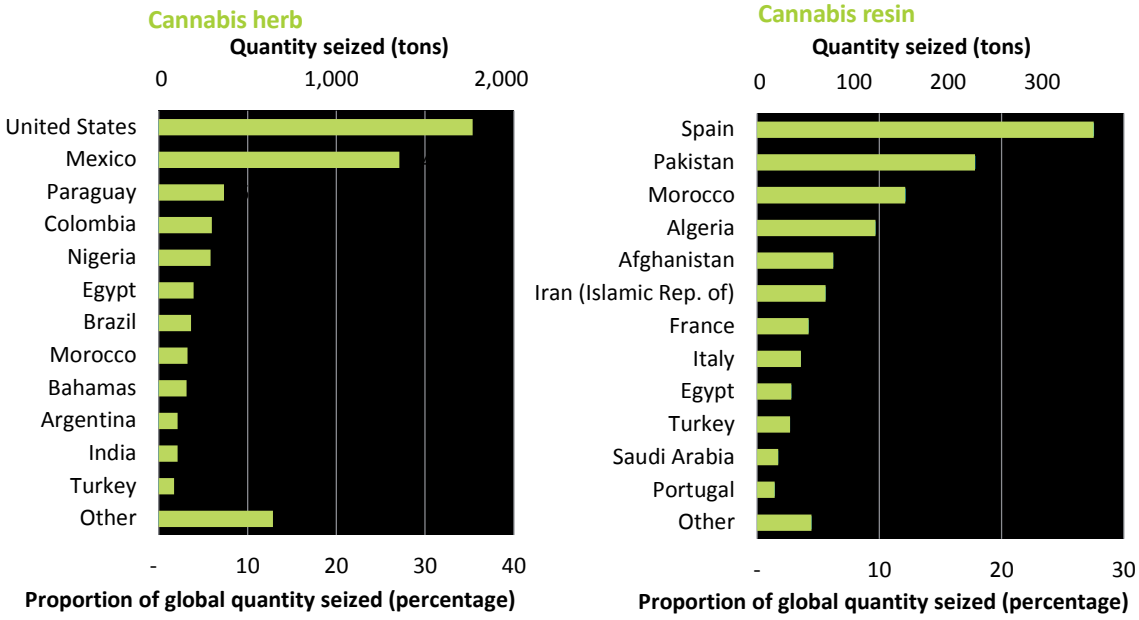


Source: UNODC, based on responses to the annual report questionnaire.

Cannabis trafficking

Based on quantities intercepted, the trafficking of cannabis seems to have stabilized at a high level in the past decade (compared with the level in the late 1990s). Over the period 2010-2015, quantities of herbal cannabis seized were more than four times those of cannabis resin, with some 6,000 tons of cannabis herb and 1,300 tons of cannabis resin intercepted annually. In 2015, the largest cannabis herb seizures worldwide were reported by Mexico, followed by the United States, Nigeria, Paraguay and Egypt; the largest cannabis resin seizures were reported by Spain, Pakistan and Morocco, followed by Afghanistan and Algeria.

FIG. 23 Global quantities of cannabis seized, annual average, by product and by country, 2010-2015



Source: UNODC, based on responses to the annual report questionnaire.

The Americas, followed by Africa, continue to report the majority of cannabis herb seizures

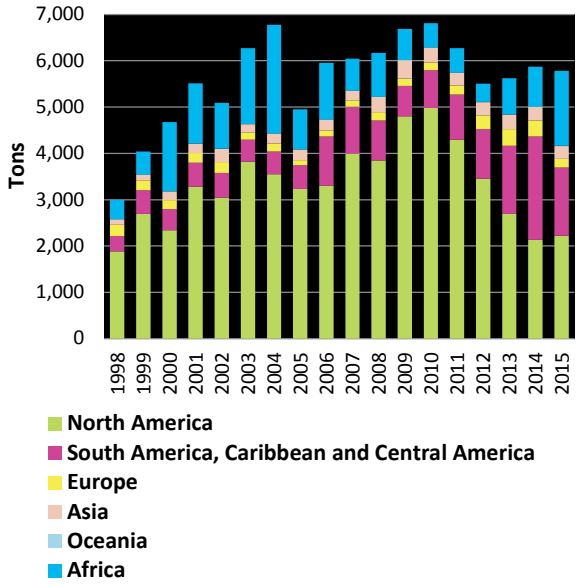
In 2015, almost two thirds (64 per cent) of the total quantity of cannabis herb seized worldwide was seized in the Americas, most notably in Mexico, followed by the United States, Paraguay and Brazil. Accounting for more than a quarter (28 per cent) of the global total, the second largest seizures of cannabis herb were reported in Africa, mostly in Nigeria, Egypt and Morocco. Asia accounted for 5 per cent of the total quantity of cannabis herb intercepted worldwide in 2015, most of which was seized by India, followed by Bangladesh, Kazakhstan, Indonesia and Thailand; 3 per cent of the total was seized in Europe, mostly by Turkey, followed by the United Kingdom, the Russian Federation, Spain and the Netherlands; and 0.1 per cent of the total was seized in Oceania, mostly in Australia.

The subregion reporting the largest quantity of cannabis herb seized in 2015 remained North America (39 per cent of global seizures). Following a peak in 2010, however, seizures of cannabis herb in North America declined by 55 per cent up to 2015 (despite rising levels of cannabis consumption), reflecting a possible fall in cannabis production in Mexico,[48] as well as an overall reduction in the priority given to cannabis interdiction as the cultivation, production, trade and consumption of cannabis has become legal in several jurisdictions in the United States in recent years.

By contrast, cannabis herb seizures more than doubled over the period 2010-2015 in Africa and South America. Meanwhile, cannabis herb seizures

48 This is in line with a decline in cannabis eradication reported by Mexico and, more importantly, with falling cannabis herb seizures along the Mexico-United States border over the period 2010-2015. While seizures of most drugs along that border have increased in recent years, cannabis herb seizures, in terms of both quantities and number of seizure cases, fell significantly between 2010 and 2015. Quantities of cannabis herb seized along the Mexico-United States border fell from more than 1,300 tons in 2010 to 900 tons in 2015 (United States Drug Enforcement Administration, *2016 National Drug Threat Assessment,* p. 135). Note that none of the states bordering Mexico had legalized cannabis over the period 2010-2015 and that cannabis continues to be prohibited at the federal level in the United States, which suggests that reduced seizures along the Mexico-United States border may have been the result of lower trafficking flows of cannabis herb from Mexico to the United States.

FIG. 24 | Quantities of cannabis herb seized, by region/subregion, 1998-2015



Sources: UNODC, responses to the annual report questionnaire; and government reports.

remained relatively stable in Asia and in Europe, with increases and decreases of less than 15 per cent. The main sources of cannabis herb in Europe are within the region itself, most notably the Netherlands and Albania, although the European Police Office (Europol) has also identified Czechia as an important distribution hub for cannabis herb trafficked to neighbouring countries.[49]

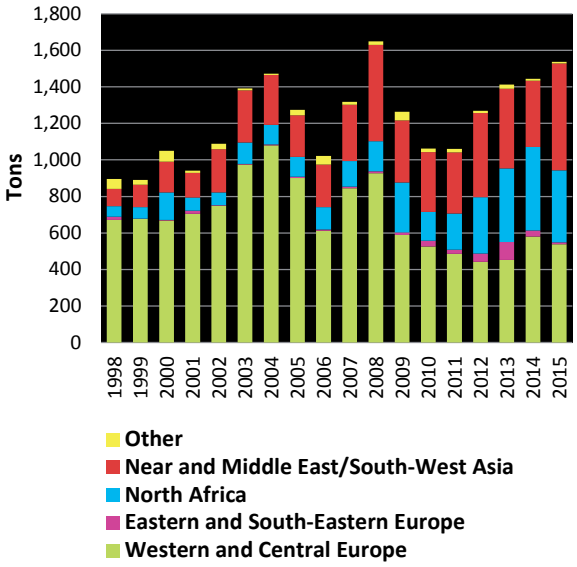
The largest quantities of cannabis resin intercepted continue to be reported in West and Central Europe, the Near and Middle East/South-West Asia and North Africa

In most years of the past two decades, the largest seizures of cannabis resin have been reported in Western and Central Europe. In 2015, however, at 38 per cent of the global total, the largest amount of seizures of cannabis resin took place in the Near and Middle East/South-West Asia, most notably in Pakistan, Afghanistan and Iran (Islamic Republic of). The next largest seizures of cannabis resin took place in Western and Central Europe (35 per cent; with seizures mostly reported by Spain, followed by Italy and France), while 26 per cent of the global total was seized by countries in North Africa (most notably Morocco, followed by Algeria and Egypt).

In contrast to the slight decline in seizures of cannabis herb worldwide over the period 2010-2015, cannabis resin seizures actually increased, reflecting a twofold increase in interceptions in North Africa and substantial increases (78 per cent) in the Near and Middle East/South-West Asia. The opposite was observed in Europe, however, where the overall quantity of cannabis resin seized, as a proportion of the global total, declined from 77 per cent in 1998 to 53 per cent in 2010 and 35 per cent in 2015. This decline primarily reflects the falling market share of cannabis resin in the European cannabis market as cannabis herb, mostly from domestic European production, has been gaining in popularity.

Cannabis resin mainly continues to be smuggled from Morocco to Europe and to other countries in North Africa, as well as from Afghanistan to neighbouring countries, particularly Pakistan and the Islamic Republic of Iran. It also seems that cannabis resin produced in Lebanon supplies markets in other

FIG. 25 | Quantities of cannabis resin seized, by selected subregion, 1998-2015



Sources: UNODC, responses to the annual report questionnaire; and government reports.

49 Europol, *SOCTA 2017: European Union Serious and Organized Crime Threat Assessment*, p. 36.

countries in the Near and Middle East, most notably the Syrian Arab Republic, Jordan and Israel, as well as markets in Egypt, Cyprus and Turkey.

In addition to ongoing direct shipments of cannabis resin from Morocco to Spain and subsequent shipments by land to France, Italy and the Netherlands, for further distribution to other European countries, Europol has reported an emerging trafficking route from Morocco to Libya (either by sea or by land) and then on to Italy. Although both UNODC and Europol data estimate that most of the cannabis resin found in Europe continues to originate in Morocco, it seems that Afghan cannabis resin is also trafficked to Europe, often using Albania as a first distribution hub.[50]

Cannabis use has remained quite stable at the global level in recent years, despite indications that it continues to increase in Africa and Asia

Equivalent to an estimated 183 million annual users in 2015 (range: 128-238 million), roughly 3.8 per cent of the global population (2.7-4.9 per cent) used cannabis in the past year. This proportion has not changed over the past decade and is only slightly higher than the prevalence of cannabis use estimated for 1998 (3.4 per cent). Nonetheless, as the world population has grown, so has the number of cannabis users (by 28 per cent since 1998). Analysis of the perception of changes in drug use, as reported by Member States, also suggests an increase in the number of cannabis users, although the increase appears to have slowed down since 2010. Cannabis use in Africa and in Asia, however, are perceived to have continued to increase relatively rapidly in the past five years.

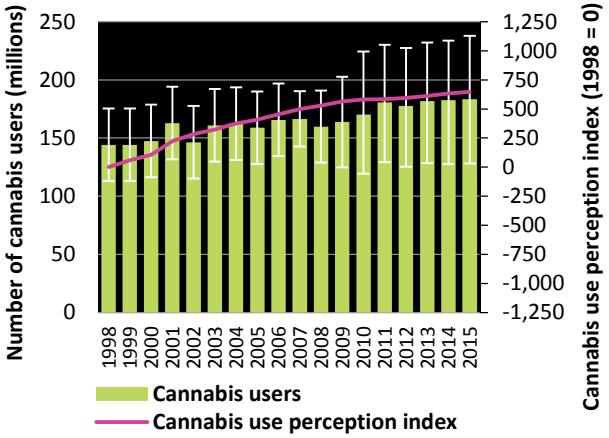
Cannabis use continues to increase in North America

Data on the prevalence of cannabis use and expert perceptions suggest that cannabis use has been rising over the past decade in the Americas. UNODC estimates for the Americas show an increase from 37.6 million people (or 6.5 per cent of the population aged 15-64 years) who used cannabis in 2005[51] to

50 Ibid., pp. 35 and 36.

51 *World Drug Report 2007* (United Nations publications, Sales No. E.07.XI.5), p. 114.

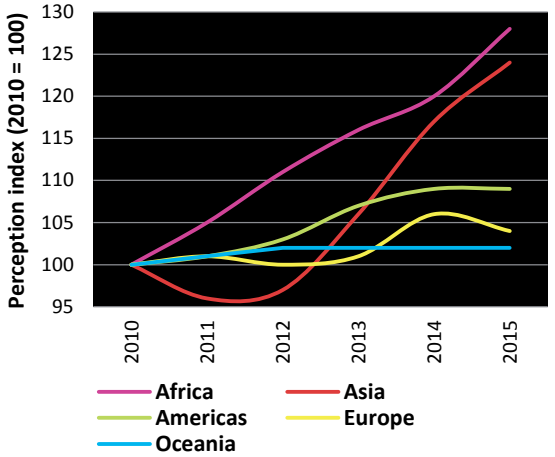
FIG. 26 Estimated number of cannabis users and cannabis use perception index,1998-2015



Source: UNODC calculations based on responses to the annual reports questionnaire.

Note: For details of the calculation methods, see the online methodology section of the present report.

FIG. 27 Cannabis use perception index, by region, 2010-2015



Source: UNODC, responses to the annual report questionnaire.

49.2 million (or 7.5 per cent of the population aged 15-64 years) in 2015. The rise in cannabis use appears to have been most pronounced in the United States, where, following some marginal declines in the prevalence of cannabis use between 2002 and 2007, the annual prevalence of cannabis use increased (by 34 per cent) to 13.5 per cent of the population aged 12 years and older over the period 2007-2015. This resulted in an overall increase of 43 per cent in the number of past-year cannabis

users, and of 54 per cent in the number of past-month users.[52] The major expansion in cannabis use across the United States has been the increase in regular and heavy cannabis users: the prevalence of daily or nearly daily use of cannabis among adults almost doubled from 1.9 per cent in 2002 to 3.5 per cent in 2015, and the number of daily or near-daily cannabis users grew by 67 per cent over the period 2007-2015.

Since 2002, the major increase in past-month cannabis use has been observed among those aged 26 years and older. An increase in the number of new initiates has also been seen among the older age groups, especially those aged 26 years and older.

The high prevalence and frequency of cannabis use observed among adults in the United States has been associated with those who perceive no risk of harm from cannabis smoking; with those from lower socioeconomic groups with no more than a high school diploma, without health insurance, and in part-time employment; those who are unable to work due to disability; those who are unemployed; and those who consider that the state in which they reside permits the medical use of cannabis.[53,54] Moreover, those who are daily or near-daily adult cannabis users without a college degree spend an average of almost 9 per cent of their household income on cannabis, while median past-month cannabis users spend on cannabis nearly the same amount as a person who smokes one pack of cigarettes a day spends on cigarettes for more details about cannabis use in the United States, see the following section.[55]

In Oceania, cannabis use in Australia increased slightly between 2007 and 2013, from an annual prevalence of 9.1 per cent to 10.2 per cent of the population age 14 years and older, although that was still significantly below the level reported in 1998 (17.9 per cent).

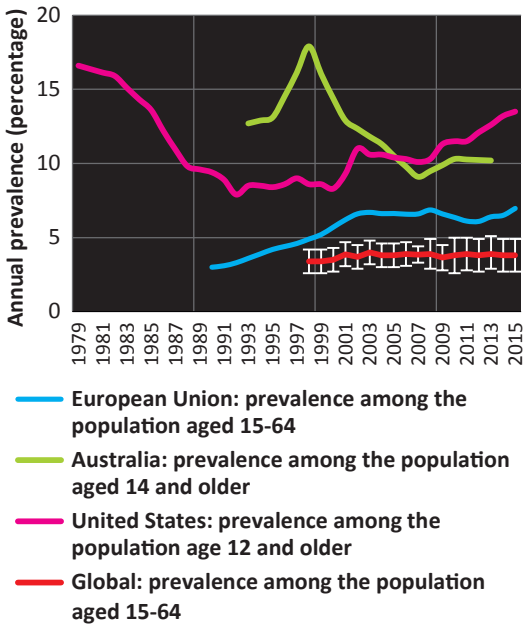
52 For more details, see subsequent discussion in this chapter.

53 Wilson M. Compton and others, "Marijuana use and use disorders in adults in the USA, 2002-14: analysis of annual cross sectional surveys", Lancet Psychiatry, vol. 3, No. 10 (2016), pp. 954-964.

54 Steven S. Davenport and Jonathan P. Caulkins, "Evolution of the United States marijuana market in the decade of liberalization before full legalization", *Journal of Drug Issues*, vol. 46, No. 4 (2016).

55 Ibid.

FIG. 28 Annual cannabis prevalence rates in the United States, the European Union, Australia, and at the global level, 1979-2015



Sources: UNODC, responses to the annual report questionnaire; SAMHSA, EMCDDA and the Australian Institute of Health and Welfare.

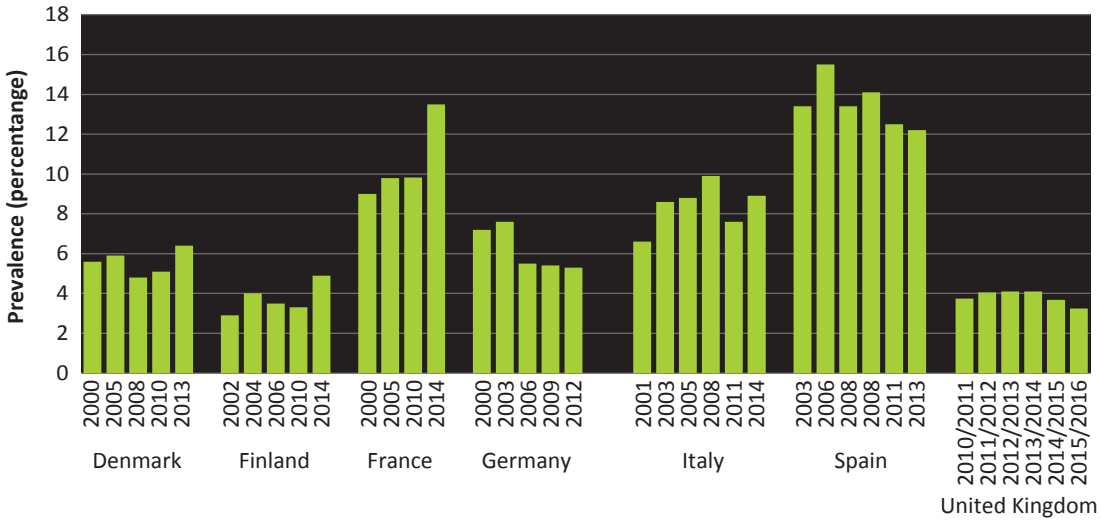
Cannabis use trends in Europe

The average past-year prevalence of cannabis use among the general population (aged 15-64 years) has remained stable over the past decade in the European Union member States, at around 6.6 per cent. However, at an annual prevalence of 13.3 per cent, cannabis use remains much higher among young people aged 15-34 years.[56] Around 3 million adults (1 per cent) in the European Union member States are estimated to be daily or near daily cannabis users, 70 per cent of whom are between 15 and 34 year of age and mostly male.

In the three countries with a high-prevalence of cannabis use, Germany, Spain and the United Kingdom (England and Wales), cannabis use has remained stable, while Denmark and France have experienced an increase in cannabis use. Many countries in Europe with historically low prevalence

56 EMCDDA, *European Drug Report: Trends and Developments 2016*, (2016 Luxembourg, Publications Office of the European Union, 2016).

FIG. 29 Trends in past-month use of cannabis among adults (aged 15-64 years) in selected high-prevalence countries



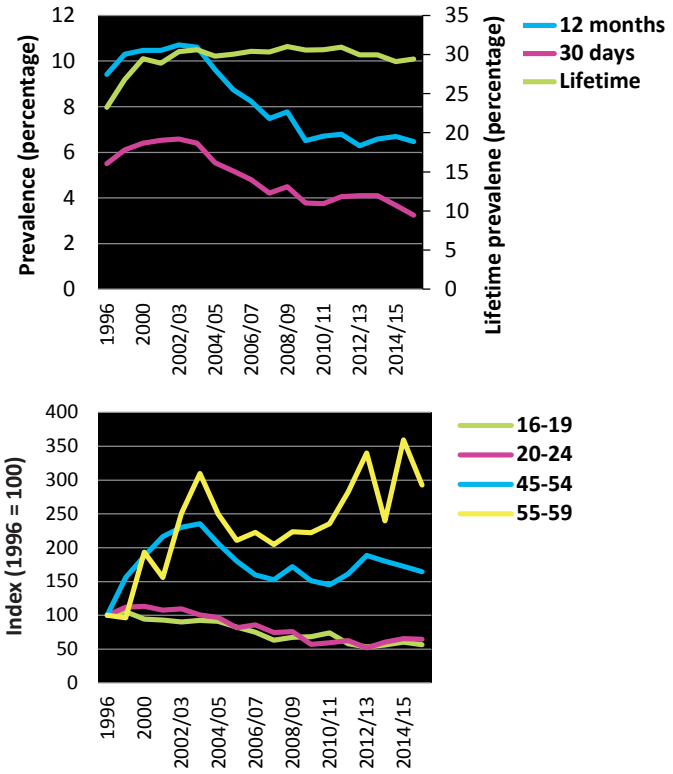
Source: EMCDDA, Statistical Bulletin, 2016.
Note: The data for the United Kingdom are from England and Wales only.

of cannabis use, such as Finland, have reported an increase in cannabis use in recent years and are now high-prevalence countries. Other countries in Europe that have shown an increase in past-year cannabis use in recent years include Bulgaria, Czechia and Sweden.[57]

Decreasing trend in cannabis use in England and Wales

Cannabis use in England and Wales has significantly declined over the past two decades. Although the annual prevalence of cannabis use remained stable between 2009/10 and 2015/16, at around 6.5 per cent of the adult population, the past-month prevalence of cannabis use decreased by 14 per cent over the same period. In 2015/16, less than half (47 per cent) of past-month cannabis users reported that they used the drug less than once a week, while only 14 per cent said they used cannabis daily or almost daily.[58]

FIG. 30 Trends in cannabis use in England and Wales, by age groups, 1996-2015/16



Source: Deborah Lader, ed., *Drug Misuse: Findings from the 2015/16 Crime Survey for England and Wales*, 2nd ed., Statistical Bulletin 07/16, (London, Home Office, 2016).

57 Ibid.

58 Deborah Lader, ed., *Drug Misuse: Findings from the 2015/16 Crime Survey for England and Wales*, 2nd ed., Statistical Bulletin 07/16 (London, Home Office, 2016).

Cannabis use is higher among younger age groups than older age groups, but it is increasing among older age groups

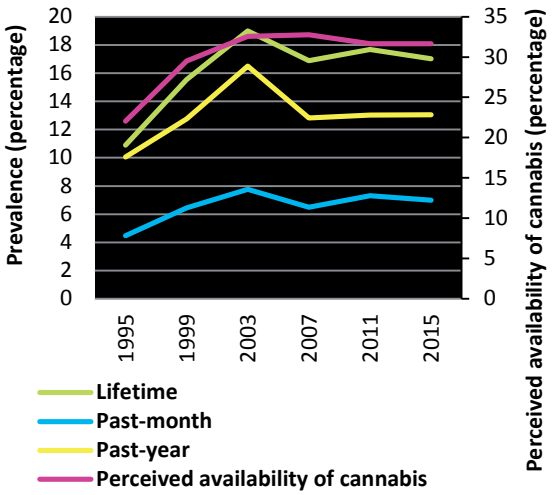
In England and Wales, there is a higher rate of cannabis use among young adults aged 16-19 years and those aged 20-24 years than among the older age groups, although both past-year and past-month prevalence have decreased significantly among young adults since 1996. Higher levels of cannabis use in the past-year were also reported among those adults who consumed alcohol three or more days a week in the past month, were unemployed or economically inactive, had a lower perception of risk of harm, as well as among those who visited nightclubs or bars/pubs on four or more occasions in the past month. While overall cannabis use is low among the older age groups (45-54 years and 55-59 years), there has been a significant increase among those age groups since 1996. Reflecting the ageing cohort of cannabis users that reported relatively higher cannabis use in the past, the past-year prevalence of cannabis use among 45-54 and 55-59 year olds has increased significantly: from 1.4 per cent and 0.5 per cent, respectively, in 1996, to 2.3 per cent and 1.5 per cent in 2015/16.[59]

Cannabis use among 15-16 year olds has declined in Europe

In 2015, the annual prevalence and past-month prevalence of cannabis use among 15-16 year olds in Europe was reported to be 13 per cent and 7 per cent, respectively;[60] on average, that age group had used cannabis 8 or 9 times in the past 12 months. Lifetime prevalence of cannabis use among adolescents varies from country to country, ranging from 37 per cent in Czechia and 31 per cent in France to 7 per cent in both Sweden and Norway. Contrary to the trends in the adult population, a decrease in the prevalence of cannabis use among adolescents was observed in Czechia, Denmark, Finland and France.

In Europe, a number of factors may play a significant role in determining the varying trends between countries in cannabis use among young people.[61] The perceived availability of cannabis and number of cannabis-using friends are positively related to cannabis use behaviours, while there is a negative correlation between perceived risk of harm in using cannabis and its actual use. The association between perceived cannabis use among peers and cannabis use among adolescents is stronger in European countries where access to cannabis is perceived to be difficult. The influence of the immediate social situation seems to be more strongly associated with cannabis use among 15-16 year olds than are distal influences related to the broader social environment.[62]

FIG. 31 Trends in cannabis use among 15-16 years old in Europe



Source: ESAPD Report 2015.

Increase in treatment of cannabis use disorders among young adults in Europe

In Europe, there was a 50 per cent increase from 2006 to 2014 in the number of first-time entrants for treatment of cannabis use disorders. The vast majority (86 per cent) of people entering treatment primarily for cannabis use disorders were aged 34 years or younger, with the mean age being 25

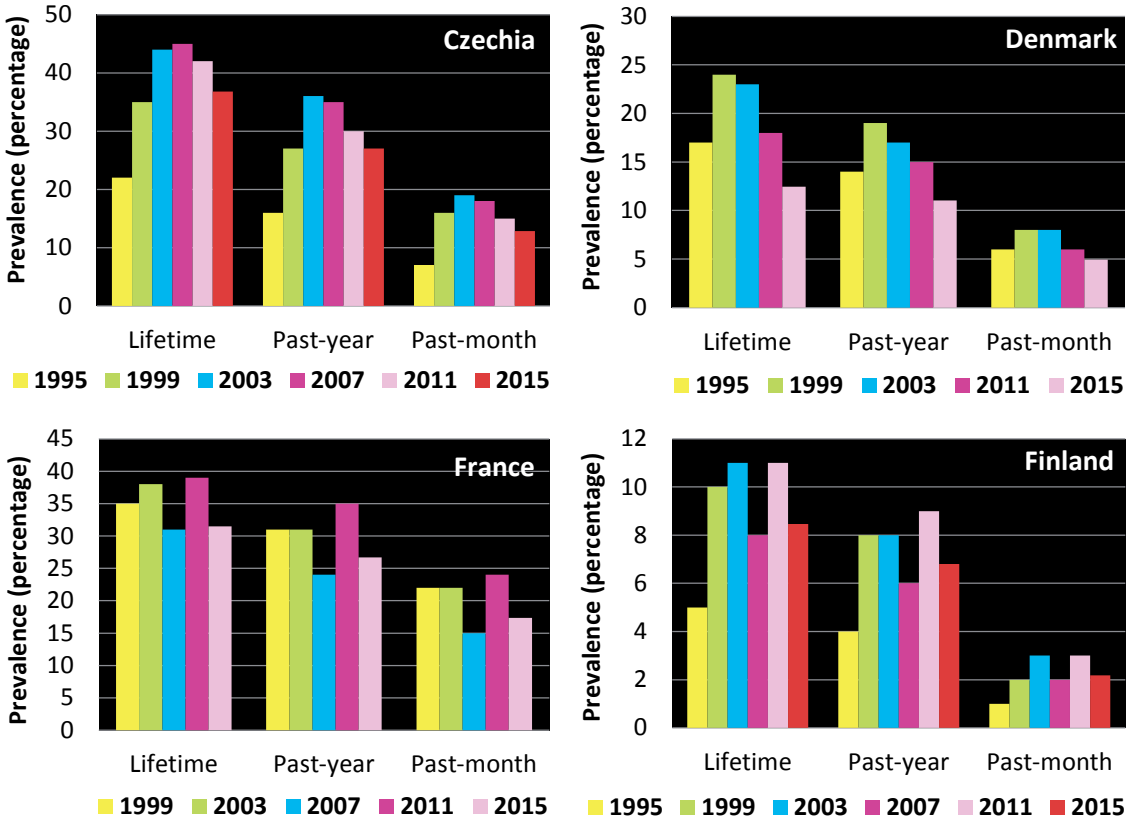
59 Ibid.

60 EMCDDA and European School Survey Project on Alcohol and Other Drugs, *ESPAD Report 2015: Results from the European School Survey Projects on Alcohol and other Drugs* (Lisbon, 2016).

61 Daniela Piontek and others, "Individual and country-level effects of cannabis-related perceptions on cannabis use: a multilevel study among adolescents in 32 European countries", *Journal of Adolescent Health*, vol. 52, No. 4 (2013), pp. 473 -479.

62 Ibid.

FIG. 32 | Trends in cannabis use among 15-16 year olds in selected countries



Source: ESAPD Report 2015.

years.[63] This increase in treatment of cannabis use disorders can be attributed to the availability of more harmful and higher-potency cannabis products — which are in turn associated with an increase in the severity of dependence and disorders — as well as to an increase in the availability of treatment and referral practices.[64, 65, 66, 67]

63 EMCDDA, "Perspectives on drugs: characteristics of frequent and high-risk cannabis users" (Lisbon, 2013).

64 T. P. Freeman and A. R. Winstock, "Examining the profile of high-potency cannabis and its association with severity of cannabis dependence", *Psychological Medicine*, vol. 45, No. 15 (2015), pp. 3181-3189.

65 EMCDDA, *European Drug Report: Trends and Developments 2016.*

66 Jonathan Schettino and others, *Treatment of Cannabis-related Disorders in Europe,* EMCDDA Insights Series No. 17 (Luxembourg, Publications Office of the European Union, 2015).

67 See *World Drug Report 2016.*

Developments in measures regulating recreational cannabis use in the United States and Uruguay

This section reviews trends in cannabis use in the United States, where there has been state-level legalization of cannabis cultivation and sale for recreational use in some states and for medical use of cannabis in others. The *World Drug Report 2016* looked at the outcome of cannabis legislation in terms of developments in public health, public safety, criminal justice and cannabis markets. This section presents some further developments in cannabis legislation in the United States and, in particular, reviews the extent of exposure of the adult and youth populations to cannabis, as well as the interplay between the use of cannabis for recreational and medical purposes. The section also provides a brief update on the status of implementation of cannabis regulation in Uruguay.

Preferences and patterns of use of plant-based cannabis and synthetic cannabinoids

The emergence of synthetic cannabinoid receptor agonist sold under names such as "Spice" and "K2", as new psychoactive substances, was first reported in 2004 and they have since been increasingly reported in different parts of the world. Synthetic cannabinoids comprise different products with chemical structures dissimilar to tetrahydrocannabinol (THC) (the principle psychoactive constituent of natural cannabis).

Effects of synthetic cannabinoid receptor agonists

There is growing recognition and reporting of the harm associated with intoxication with synthetic cannabinoids, which results in emergency room visits. The symptoms include tachycardia, psychosis, agitation, anxiety, breathing difficulties and seizures. The literature also shows that the use of synthetic cannabinoids has unpredictable negative psychological and physiological effects. Intoxication with some forms of synthetic cannabinoids can have severe effects; for instance, in an outbreak in New York, people reported experiencing "zombie-like" severe depressant effects after intoxication with the synthetic cannabinoid AMB-FUBINACA.

Experiences of cannabis users

The self-reported experiences of cannabis users who had recently used synthetic and natural cannabis show that almost all recent synthetic cannabinoid users reported that they had used natural cannabis, which they preferred over synthetic cannabinoids and used for a greater number of days. The use of synthetic cannabinoids is associated with more overall negative effects than the use of natural cannabis, including greater effects on the lungs, hangover effects and a greater level of anxiety and paranoia, as reported by users. Among those cannabis users, natural cannabis was considered to produce more memory impairment than synthetic cannabinoids, and was perceived to be more addictive. Natural cannabis was, however, considered a more consistent product than synthetic cannabinoids.

Overall, synthetic cannabinoids represent a diverse group of potent psychoactive compounds that are considered a substitute for natural cannabis but may result in acute intoxication and have long-term negative effects on health. Many cannabis users, such as those in prison settings, may substitute cannabis with synthetic cannabinoids to avoid sanctions (for details, see booklet 4 of this report). However, it cannot be concluded that the untoward or undesirable effects of synthetic cannabinoid receptor agonists will limit their uptake or use.

Sources:

Adam R. Winstock and Monica J. Barrat, "Synthetic cannabis: A comparison of patterns of use and effect profile with natural cannabis in a large global sample", *Drug and Alcohol Dependence*, Volume 131, Issues 1–2, 1 July 2013, Pages 106-111.

Adam R. Winstock and Monica J. Barrat, "The 12-month prevalence and nature of adverse experiences resulting in emergency medical presentations associated with the use of synthetic cannabinoid products", Human Psychopharmacology: Clinical and Experimental, July 2013, Volume 28, Issue 4, Pages 390-393.

Tracy L. Brewer and Margie Collins, "A review of clinical manifestations in adolescent and young adults after use of synthetic cannabinoids", *Journal for specialists in Pedriatic Nursing*, April 2014, Volume 19, Issue 2, p 119-126.

Axel J Adams and others, "'Zombie' Outbreak Caused by the Synthetic Cannabinoid AMB-FUBINACA in New York", *New England Journal of Medicine*, 2017; 376:235-242 January 19, 2017 DOI: 10.1056/NEJMoa1610300.

Recent developments in the United States

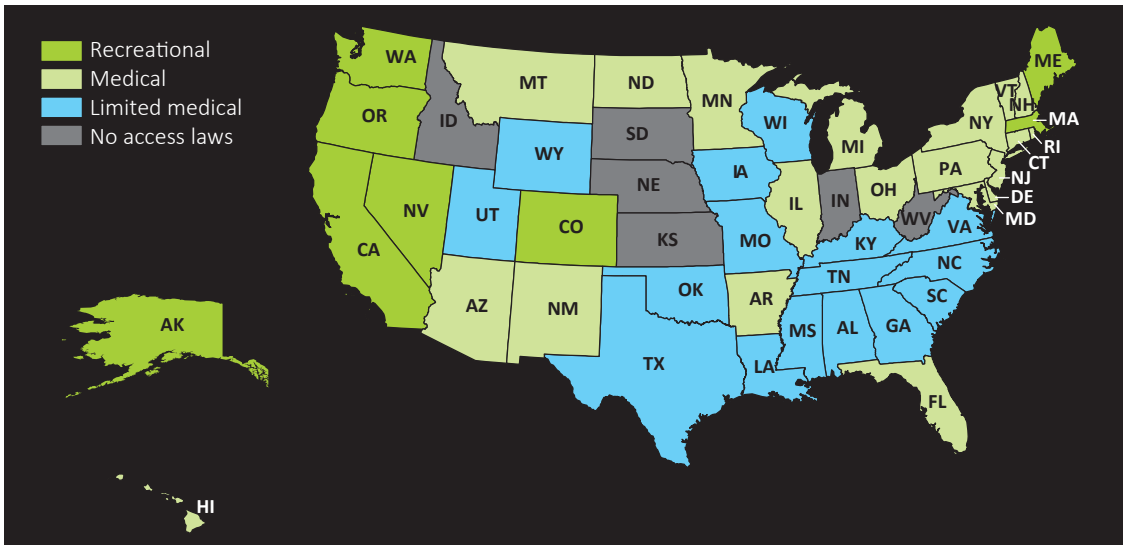
In 2016, voters in California, Maine, Massachusetts and Nevada voted to allow the legalization of cannabis for recreational use in their jurisdictions, while voters in one state rejected the proposition to legalize cannabis cultivation and use. The approved measures allow adults aged 21 years and older in those four states to possess cannabis for personal use and to grow cannabis plants at home. The total number of state-level jurisdictions that now allow use of cannabis for recreational purposes has grown to eight, plus the District of Columbia.[68, 69] Of much greater importance is that all those jurisdictions, not including the District of Columbia, are now licensing or are in the process of developing licensing schemes to enable for-profit companies to produce, market and sell a wide range of cannabis products. All of the states that have legalized cannabis use had prior measures allowing the medical use of cannabis.

The regulations that allow the sale and personal use of cannabis across the different jurisdictions permitting such measures differ in their provisions as well as in their implementation, as summarized in the annex of this booklet. Nevertheless, the states that voted in favour of the cultivation, sale and personal possession of cannabis for recreational use in 2016 have some measures that are similar to those passed by the four states that had previously permitted recreational cannabis use. These measures include: the establishment of a regulatory authority and a commercial system of production and supply

68 Home cultivation is not allowed in the State of Washington. The number of plants allowed in each state varies.

69 National Conference of State Legislatures (www.ncsl.org).

MAP 3 Jurisdictions in the United States that allow recreational use, medical use of cannabis and those that allow no access to cannabis



Source: Based on information from the National Conference of State Legislatures (NCSL) as of 12 May 2017.
Notes: The boundaries shown on this map do not imply official endorsement or acceptance by the United Nations.

by private enterprises; taxation at retail and, in some jurisdictions, at the production or cultivation levels; certain restrictions on advertisements; packaging and labelling restrictions on edibles; and measures concerning health and safety standards. California, Maine, Massachusetts and Nevada also allow on-premises consumption of cannabis at retail or specially licensed establishments.[70] As it is partly within the federal territory, the District of Columbia allows "home grown and home use" because people can still be arrested for possession of cannabis in the federal territory.[71] Many issues remain unresolved. The legislation that was approved in most of these states did not set a maximum limit on THC content, whereas states such as Oregon have since done so; other states such as California are in the rule-making process for the implementation of cannabis legislation.

In the 2016 election, voters in four other states, Arkansas, Florida, Montana and North Dakota, voted for measures to allow medical cannabis. In April 2017, West Virginia also passed legislation, making a total of 29 states that now have comprehensive laws allowing the production, sale and use of cannabis for medical conditions. These include the states with measures allowing the production and sale of cannabis for recreational use. In the District of Columbia, the law allows patients to obtain cannabis for medical use only from a dispensary licensed by the District's Health Department and does not allow patients or their caregivers to grow cannabis. A further 16 states have laws that allow the use of products containing low THC levels and/or high cannabidiol (CBD) levels for medical conditions such as epileptic seizures or seizure disorders.[72]

The evaluation of the impact of the measures allowing the commercial production, sale and recreational use of cannabis on health, criminal justice and other outcomes requires regular monitoring over time, and it may take years to determine their long-term effect on cannabis use and associated harm among adults, as well as their influence on cannabis use

70 BOTEC Analysis, "Cannabis report: the 2016 election and ballot initiatives", 26 October 2016. Available at http://botecanalysis.com/cannabis-the-election/; accessed 12 May 2017.

71 Department of Health of the District of Columbia, "Marijuana in the District of Columbia", LaQuandra S. Nesbitt and others, eds. (July 2016).

72 National Conference of State Legislatures, "State medical marijuana laws", 21 April 2017. Available at www.ncsl.org/research/health/state-medical-marijuana-laws.aspx.

Medical marijuana in the United States

Many countries have regulations that allow the use of cannabinoid-based medications. Similar to the approval of any pharmaceutical product, the approval of cannabinoid-based medications typically follows an established protocol in which clinical trials have proved the preparation to be effective for determined conditions and recommendations are made on dosages and conditions for use. In the United States, the approval of cannabis for medical purposes has followed a more complex pattern. The United States Food and Drug Administration (FDA), the federal agency in charge of approving medications for the United States market, has so far approved three non-botanical formulations based on the molecular structure of cannabinoids — dronabinol, a synthetic 9-tetrahydrocannabinol, its oral capsule and liquid formulations and, nabilone, a synthetic analogue of THC for oral use. Several additional cannabinoid-based medications — Sativex[a] (composed of THC and CBD), Epidiolex (cannabidiol oil) and another CBD oral solution were each granted Fast Track designations by FDA to facilitate development and expedite FDA review of their respective therapeutic indications.[b] According to the United States National Academies of Sciences, Engineering and Medicine, in California, clinical and preclinical trials of cannabinoids were initiated in 2000, with 13 out of the 21 approved studies completed. In Colorado, research on the medicinal benefits of cannabis products was initiated in 2015.[c]

As of May 2017, independent of the approval of pharmaceutical preparations, the use of cannabis products, such as herb (for vaporizing), extracts (tinctures), edibles and capsules for medical purposes, has been introduced in 29 states through statutory laws or constitutional amendments as voter initiatives, either through direct ballot or through state legislatures.[c] Although most states currently have, or had in the past, a therapeutic research programme, the cannabis products that are dispensed have not been developed through rigorous scientific processes. No products "developed" from state research programmes have received FDA approval. While the conditions that allow medical use of cannabis vary in each of those 29 states, most of the states require that a physician submit a signed form to the state regarding a person's eligibility for such use and most have a programme for registering patients for medical use of cannabis based on the physician's recommendation. In California and Maine, however, the registration of patients is considered voluntary or optional, whereas the state of Washington has no system for the registration of medical cannabis users in place. Many states such as California allow medical use of cannabis for a broad set of indications that may include any serious medical condition for which cannabis could provide relief.[d,e] In some states the law requires the state to produce and distribute cannabis products, including plants (for vaporizing), tinctures and capsules, in clinical settings, while in other states doctors are required to prescribe cannabis products and monitor the results. However, these measures have proved unworkable as they require physicians or clinics to violate federal law. While the states that allow medical use of cannabis have passed legislation regulating the production, sale and dispensation of medical cannabis, there are differences in the manner and length of time in which these measures have been implemented.

Although there are plans by the National Institute on Drug Abuse at the national level to provide a range of clinically relevant cannabis products for research, there are significant regulatory barriers for conducting such research on the health effects of different cannabis products. Also, those products need to be comparable with or relevant to the range of medical cannabis products used by consumers in the states where use of medical cannabis is permitted.[f] In most of those states the range of products currently available for medical purposes has not gone through the rigours of research in product development, clinical trials determining health effects, optimum dosage, standardized dosing, methods of administration and overall quality control measures employed for all pharmaceutical products.

a As of September 2016, Nabiximols has been launched in 15 countries and approved in a further 12.

b National Academies of Sciences, Engineering, and Medicine, *The Health Effects Of Cannabis And Cannabinoids: The Current State of Evidence and Recommendations for Research* (Washington, D. C, National Academies Press, 2017).

c Marijuana Policy Project, "State-by-State medical marijuana laws: how to remove the threat of arrest, 2015" (Washington, D. C, 2016).

d Rosalie L. Pacula and others, "State medical marijuana laws: understanding the laws and their limitations", *Journal of Public Health Policy*, vol. 23, No. 4 (2002), pp. 23, 413-439.

e Fairman, J, B., "Trends in registered medical marijuana participation across 13 US states and District of Columbia", *Drug and Alcohol Dependence*, 159 (2016) 72-79.

f National Academies of Sciences, Engineering, and Medicine, *The Health Effects of Cannabis and Cannabinoids.*

among adolescents.[73] Indeed, since the effects of changes in one state spill over and affect other states, there remain limitations to the evaluation of the effects of these policy changes due to extraneous factors.[74] One example of these limitations is the comparison of trends in the perceived risk of cannabis use in the states that have, and those that have not, legalized cannabis. Risk perceptions of harm negatively influence cannabis use behaviours and

73 Wayne Hall and Megan Weier, "Assessing the public health impacts of legalizing recreational cannabis use in the USA", Clinical Pharmacology and Therapeutics, vol. 97 (June 2015), pp. 607-615.

74 Wayne Hall and Megan Weier, "Has marijuana legalization increased marijuana use among US youth", *JAMA Paediatrics*, Vol. 171, No. 2 (February 2017), pp. 116-118.

are considered a protective factor; however, risk perceptions among the general population have declined over the years in the entire United States due to a number of factors, which include: the spillover effects of policy debates over legalization; an increase in cannabis use, which is perceived to be less risky among users; and the media coverage of the medical use of cannabis in many states.[75] In addition, legislation and contexts vary considerably across states that have passed legislation legalizing recreational and medical cannabis. Therefore, general analysis comparing states that allow recreational markets with those that do not has limitations.

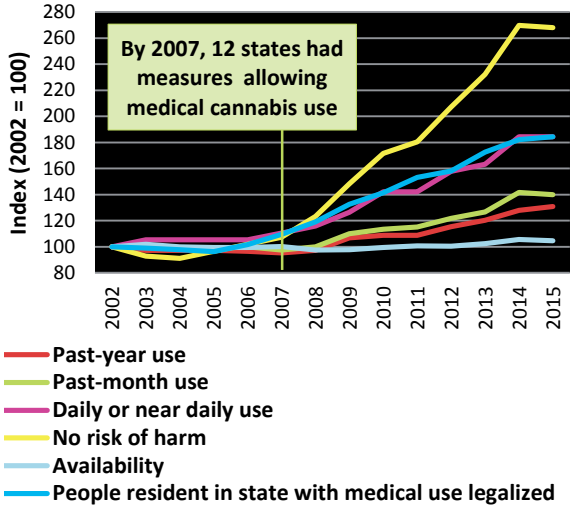
The following sections review some of these issues in an attempt to understand the influence of measures regulating cannabis production and use on behaviours related to cannabis use in the general population.

The approval of state-level cannabis regulations has occurred in an environment of overall increase in cannabis use across the United States

It is challenging to measure the health impact of the new regulations implemented by some of the states in the United States since cannabis laws have changed in concomitance with a series of other elements that have changed the cannabis market not only in the concerned states, but across the entire United States. Overall, cannabis use has increased in the United States among adults aged 18 years and older since 2002.[76] This has occurred in an environment with decreasing perceptions of risk of harm from cannabis use, in which some states have permitted the medical use of cannabis, and with extensive media coverage of state level debates around the medical use or legalization of cannabis for recreational use.

The increase in cannabis use has been among heavy users and those aged 26 years or older, in particular.[77] The high prevalence and frequency of cannabis use observed among adults has been associated with those who perceive no risk of harm from cannabis smoking; among those from lower socioeconomic groups; and those residing in a jurisdiction that permitted the medical use of cannabis.[78, 79] According to data from the National Survey on Drug Use and Health (NSDUH), the past-month prevalence of cannabis use among the population aged 12 years and older in the United States increased from 6.2 per cent in 2002 to 8.3 per cent in 2015, with an estimated 22 million people aged 12 years and older being current (past-month) cannabis users in 2015.[80] Since 2008 there has been a consistent year-on-year increase in cannabis use among the

FIG. 33 United States: cannabis use patterns, risk perception, availability and medical cannabis among the population aged 18 years and older, 2002-2015



Sources: *Key Substance Use and Mental Health Indicators in the United States: Results from the 2015 National Survey on Drug Use and Health*,
and earlier surveys and adapted from Compton and others, "Marijuana use and use disorders in adults in the USA, 2002-14: analysis of annual cross sectional surveys", Lancet Psychiatry 2016; 3: 954-64.

Note: Compton and others analysed the trends in cannabis use from 2002-2014.

75 Ibid.

76 Alejandro Azofeifa and others "National estimates of marijuana use and related indicators – National Survey on Drug Use and Health", United States, 2002–2014. *MMWR Surveillance Summaries* 2016; 65, No. SS-11, pp.1-25. Available at http://dx.doi.org/10.15585/mmwr.ss6511a1.

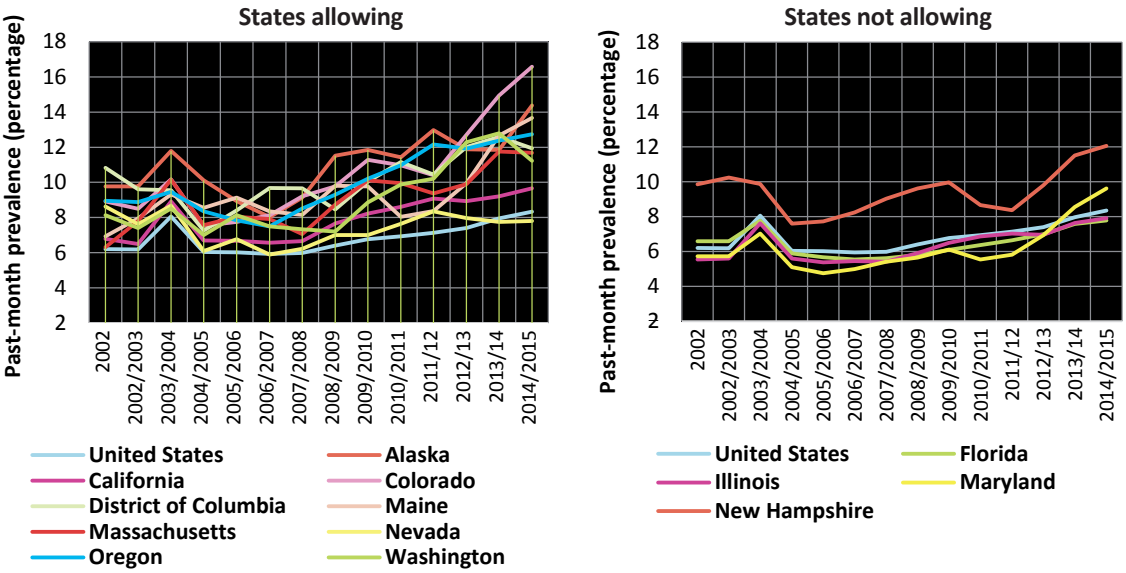
77 Wilson M. Compton and others, "Marijuana use and use disorders in adults in the USA, 2002-14: analysis of annual cross sectional surveys", *Lancet Psychiatry* 2016; 3: 954-64.

78 Ibid.

79 Davenport and Caulkins, "Evolution of the United States marijuana market".

80 Center for Behavioral Health Statistics and Quality, *"Key substance use and mental health indicators in the United States: Results from the 2015 National Survey on Drug Use and Health"* (HHS Publication No. SMA 16-4984, NSDUH Series H-51). Retrieved from http://www.samhsa.gov/data/.

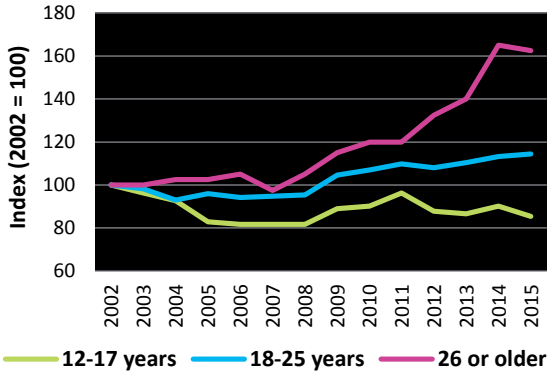
FIG. 34 Cannabis use in the past month among the population aged 12 years and older in the United States as a whole, in states with measures allowing recreational cannabis market, and other selected states, 2002-2015



Source: *Key Substance Use and Mental Health Indicators in the United States: Results from the 2015 National Survey on Drug Use and Health,* earlier surveys and SAMHSA State level estimates for the different years. Except for 2002, the state level estimates are presented as two-year averages. Alaska, Colorado, California, Maine, Nevada and Oregon had medical cannabis in 2000 or earlier.

population aged 12 years and older, particularly in those states that currently allow the production and sale of cannabis for recreational use among adults. In those states, rates of cannabis use higher than the national average have been observed, although they precede any measures to legalize cannabis. The increase in cannabis use, although not in all states, can also be seen in those states that have not legalized recreational use of cannabis. Overall, the increasing trend in cannabis use is considered to be associated with provisions of medical cannabis — with the evidence suggesting an overall reciprocal relationship between social attitudes and cannabis use patterns.[81] Beginning with California in 1996 and followed by Alaska, Oregon and Washington in 1998, 12 jurisdictions had made provisions for the medical use of cannabis by 2007. The cumulative effects of these policy changes might have led to changes in the risk perceptions of harm from cannabis use among the adult population and a subsequent increase in cannabis use.[82]

FIG. 35 United States: trends in cannabis use initiation in the past year, by age groups, 2002-2015

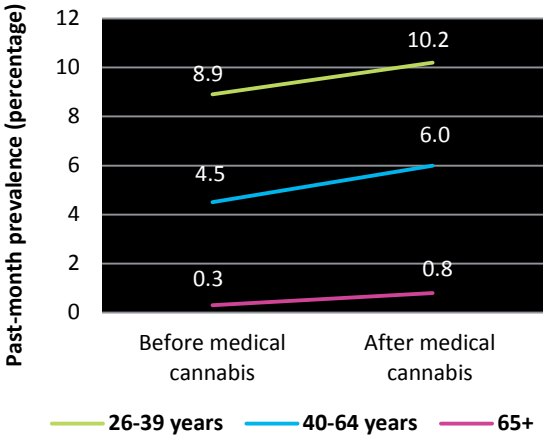


Source: Elaborated from NSDUH presented in Rachel N. Lipari and others, "Risk and protective factors and estimates of substance use initiation: results from the 2015 National Survey on Drug Use and Health" (SAMHSA, October 2016).

81 Rosalie L. Pacula and others, "Assessing the effects of medical marijuana laws on marijuana use: the devil is in the details", *Journal of Policy Analysis and Management,* vol. 34, No. 1 (2015), pp. 7-31.

82 Compton and others, "Marijuana use and use disorders in adults in the USA, 2002-14".

FIG. 36 Past-month prevalence of non-medical cannabis use among older age groups, prior to and following the legalization of medical cannabis use, 2004-2013



Source: Silvia S. Martins and others, "State-level medical marijuana laws, marijuana use and perceived availability of marijuana among the general US population", *Drug and Alcohol Dependence*, vol. 1 (December 2016), pp. 26-32.

Medical cannabis use regulations may have influenced the risk of adult non-medical cannabis use

Compared with the other states, those that allow medical use of cannabis have higher prevalence of past-month non-medical use of cannabis in all age groups. But laws that permit the medical use of cannabis appear, as yet, to have had little effect on the prevalence rate of recreational use of cannabis among adolescents, while they may have influenced the risk of non-medical cannabis use among the adult population.[83, 84, 85]

In the states that allow medical cannabis use, past-month non-medical use of cannabis increased significantly among the population aged 26 years and older from 5.8 per cent to 7.2 per cent over the period 2004-2013. Among the younger age groups (12-17 years and 18-25 years), however, changes in the prevalence of non-medical cannabis use were not statistically significant and not considered to be related to the measures that allow the use of cannabis for medical purposes.[86] Cannabis users living in the states that have measures allowing medical cannabis use also reported a higher perception of easy availability of cannabis. Although this perception has not changed among the younger age groups (12-17 and 18-25) since medical cannabis laws were introduced in those states, there has been a significant increase in the perceived easy availability of cannabis among those aged 26 years or older.[87] Past-month recreational cannabis use and the perceptions of easy availability of cannabis have increased significantly in all the older groups since the passing of medical cannabis laws.[88, 89]

Difference between recreational and medical users in the United States

In March 2016, around 1.2 million people were estimated to be registered for medical cannabis cards across the United States,[90, 91] which corresponds to eight medical cannabis patients per 1,000 population. The highest rates of registration per 1,000 population were in Colorado (19.8), California (19.4), Washington (19.2) and Oregon (19.2); states with the longest standing medical cannabis provisions.[92] However, these estimates should be considered with caution as several states do not maintain registries of medical cannabis.

83 Melanie M. Wall and others, "Prevalence of marijuana use does not differentially increase among youth after states pass medical marijuana laws: commentary on Stolzenberg et al. (2015) and reanalysis of US National Survey on Drug Use in Households data 2002–2011", *International Journal of Drug Policy*, vol. 29 (2016), pp. 9-13.

84 Deborah S. Hasin and others, "State medical marijuana laws and adolescent marijuana use in the United States: 1991-2014", *Lancet Psychiatry*, vol. 2, No. 7 (July 2015), pp. 601-608.

85 Silvia S. Martins and others, "State-level medical marijuana laws, marijuana use and perceived availability of marijuana among the general US population", *Drug and Alcohol Dependence*, vol. 1 (December 2016), pp. 26-32.

86 Ibid.

87 Ibid.

88 Ibid.

89 Alejandro Azofeifa and others "National estimates of marijuana use and related indicators – National Survey on Drug Use and Health".

90 Estimated number of medical cannabis users registered in 21 out of 23 states and the District of Columbia that have medical cannabis laws.

91 ProCon.org, "Number of legal medical marijuana patients (as of 1 March 2016)". Available at http://medicalmarijuana.procon.org/view.resource.php?resourceID=005889 (last updated on 3 March 2016).

92 The medical cannabis law in California was passed in 1996, in Oregon and Washington in 1998 and in Colorado in 2000.

In the United States, the National Academies of Sciences, Engineering and Medicine recently published *The Health Effects of Cannabis and Cannabinoids: the Current State of Evidence and Recommendations for Research*. A summary of NAS evidence of the therapeutic effects of products based on cannabis and cannabinoids and the statistical association between cannabis use and the incurrence of health conditions can be found in the annex of this booklet.

According to the National Academies of Sciences, Engineering and Medicine, there is evidence that medical use of cannabis-based products is effective for a limited number of conditions[93] (see the annex of this booklet). However, it is likely that in the medical cannabis system in place in the jurisdictions in United States, not all of the people who have a condition that may qualify for medical cannabis products are registered; conversely, many patients who are registered may not even have a medical condition.[94] Studies also suggest that younger registrants may be more likely to engage in the diversion of medical cannabis or may only be registered in order to circumvent the laws prohibiting recreational cannabis use, although the exact extent of this is not known.[95] Trends in the characteristics of people participating in medical cannabis programmes can help understand the public health and policy issues surrounding access to medical cannabis, although this information is not available uniformly in all states with such programmes.[96] Based on data from the states where multiple data points on registered medical cannabis use were available, the majority (between 50 per cent and 75 per cent) of patients registered in medical cannabis programmes were male. The age distribution of participants in eight states shows that a large proportion of registrants were in their 40s and 50s. However, this was different in states such as Colorado and Arizona where young adults (18-30 years) made up around one quarter of the participants in medical cannabis programmes.[97]

93 *The Health Effects of Cannabis and Cannabinoids.*

94 "Number of legal medical marijuana patients". Available at http://medicalmarijuana.procon.org/view.resource.php?resourceID=005889.

95 Fairman, "Trends in registered medical marijuana participation".

96 Ibid.

97 Ibid.

In many jurisdictions the medical cannabis market is used for both medical and recreational purposes. According to a national consumer panel survey of adults in 2014, more than one third of the respondents reported current use of medical cannabis for both medical and recreational purposes.[98] Those who use medical cannabis solely for medical purposes tend to use it for alleviating perceived medical symptoms in addition to alleviating anxiety, depression or other psychological symptoms.[99] Recreational cannabis users who access the medical cannabis market may be a heterogeneous group who use cannabis for different motives, including experimentation, coping and other social or psychological reasons.[100, 101] NSDUH data from 2013 and 2014 show that medical cannabis use was associated with the older age groups, poorer health status and with anxiety disorder.[102] Furthermore, among people reporting medical cannabis use the prevalence of daily or almost daily cannabis use was three times higher than among those reporting recreational use, although the same proportion (11 per cent and 10 per cent, respectively) of individuals who used cannabis recreationally or medically met the criteria for cannabis use disorders. Both groups had similar levels of depression, although medical cannabis users were less likely to meet the criteria for alcohol use disorder or to use other illicit drugs. Similarities in correlates of medical and non-medical cannabis users, especially co-occurrence of psychiatric conditions and other substance use, suggest that some cannabis users may access medical cannabis without a diagnosed medical need.[103, 104]

98 Gillian L. Schauer, and others, "Toking, Vaping, and Eating for Health or Fun Marijuana Use Patterns in Adults, U.S., 2014" *American Journal of Preventive Medicine*, vol. 50, No. 1, pp. 1-8 (January 2016).

99 Wilson M. Compton and others, "Use of marijuana for medical purposes among adults in the United States", *JAMA*, vol. 317, No. 2 (2017), pp. 209-211.

100 Lewei A. Lin and others, "Comparing adults who use cannabis medically with those who use recreationally: results from a national sample", *Addictive Behaviors*, vol. 61 (2016), pp. 99-103.

101 Wilson M. Compton and others, "Use of marijuana for medical purposes among adults in the United States", *JAMA*, vol. 317, No. 2 (2017), pp. 209-211.

102 Ibid.

103 Ibid.

104 Marcel O. Bon-Miller and others, "Self-reported cannabis use characteristics, patterns and helpfulness among medical cannabis users", *American Journal of Drug and Alcohol Abuse*, vol. 40, No. 1 (2014), pp. 23-30.

Has cannabis use among high school students changed in states that have legalized recreational cannabis use?

One important element in understanding the impact of legalizing recreational use of cannabis is to examine the extent to which such measures have influenced and affected the use of cannabis by adolescents. Current research on the subject remains inconclusive, however. National data show that, in contrast to the increase in cannabis use among adults, the prevalence of past-year and past-month cannabis use across the United States has declined among 8th and 10th grade high school students and has remained unchanged among twelfth graders in the past five years or so. Similarly, current daily use or near daily use has declined among 8th and 10th graders and has remained at similar levels among twelfth graders over the same period.[105]

Some studies have looked at state level data and concluded that past-year cannabis use is higher among twelfth grade students in states with laws permitting the use of cannabis for medical purposes than in states without such laws (38.3 per cent vs. 33.3 per cent), although these studies suggest that these differences precede those measures, presumably, in part, because states that allow the use of medical cannabis have had very liberal medical cannabis laws.[106, 107]

A study based on data from the Monitoring the Future survey compared trends in cannabis use among high school students in Colorado and Washington over the periods 2010-2012 and 2013-2015 with those in states that had not, at that time, legalized recreational use of cannabis.[108] The study showed that there was an increase in cannabis use among eighth and tenth graders in the state of Washington after cannabis had been legalized. In Colorado, cannabis use among eighth and tenth graders remained stable or decreased, while in states that had not legalized recreational cannabis use it declined. Past-month cannabis use among twelfth graders remained at similar levels in Colorado, Washington and in states that had not legalized recreational cannabis use. However, the data used in this study were not representative at state level. Different data from the State Healthy Youth Survey showed that the prevalence of cannabis use among tenth graders remained unchanged in Washington during the period 2001-2014.[109]

Different trends in different states could relate to exposure to the medical cannabis market. The expansion of for-profit dispensaries in Colorado had effectively legalized the commercial supply of cannabis before the laws were passed to allow for recreational use. Cannabis use among youth may not have changed as they would have already formed their attitudes and beliefs about cannabis use and were therefore less likely to be influenced by legalization measures.

Earlier studies found no differences in rates of change in cannabis use among youth or in the perceived risk of cannabis use between states that allow medical cannabis use and those that do not.[110, 111] It is not conclusive whether legalizing cannabis for recreational use among adults would influence its use among adolescents,[112] and further quality data and analysis representative at state level of long-term trends are required to address the question.

105 Lloyd D. Johnston and others, Monitoring the Future National Survey Results on Drug Use, 1975-2016: Overview, Key Findings on Adolescent Drug Use (Ann Arbor, Michigan, University of Michigan Institute for Social Research, 2017).

106 United States, National Institute on Drug Abuse, Monitoring the Future Survey: High School and Youth Trends (revised December 2016).

107 Deborah Hasin and others, "State medical marijuana laws and adolescent marijuana use in the United States: 1991-2014.

108 Magdalena Cerdá, and others "Association of state recreational marijuana laws with adolescent marijuana use", *JAMA Pedriatic*, vol. 171, No. 2 (February 2017).

109 Anar Shah and Mandy Stahre, "Marijuana use among 10th grade students – Washington, 2014". *Morbidity and Mortality Weekly Report,* 65 (30 December 2016), pp. 1421-1424. DOI: http://dx.doi.org/10.15585/mmwr.mm655051a1

110 Melanie M. Wall and others, "Adolescent marijuana use from 2002 to 2008: higher in States with medical marijuana laws, cause still unclear", *Annals of Epidemiology*, vol. 21, No. 9 (September 2011) pp. 714-716.

111 Sam Harper, Erin C. Strumpf and Jay S. Kaufman, "Do medical marijuana laws increase marijuana use? Replication study and extension", *Annals of Epidemiology*, vol. 22, No. 3 (March 2012), pp. 207-212.

112 Cerdá and others "Association of state recreational marijuana laws with adolescent marijuana use".

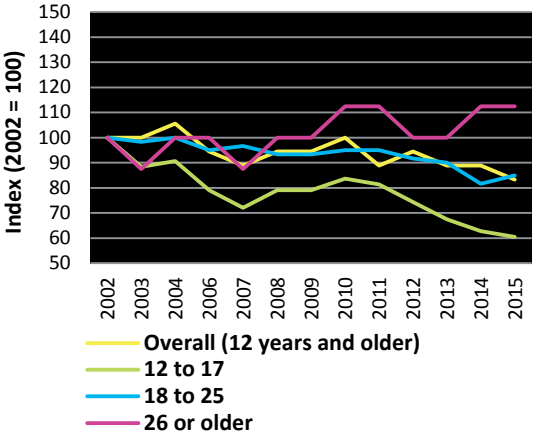
Has problematic use of cannabis increased as a result of increased cannabis use in the United States?

It has been noted that in the current environment of lower risk perceptions of harm from cannabis use and measures allowing the medical or non-medical use of cannabis, the number of new cannabis users among older adults, and/or of older adults resuming cannabis use, has increased. However, trends in cannabis use disorders are mixed. At around 1.5 per cent, the prevalence of cannabis use disorders[113] among the adult population (18 years and older) of the United States remained stable during the period 2002-2015, while the proportion of cannabis use disorders among regular adult users declined from 14.8 per cent in 2002 to 11 per cent in 2015.[114] Similar trends could be observed in the population aged 12 years and older: the proportion of cannabis use disorders among past-year cannabis users decreased by almost one third (from 16.7 per cent in 2002 to 11.9 per cent) in 2014).[115] The overall prevalence of cannabis use disorders among the population aged 12 years and older as well as among all the other age groups, except for those aged 26 years and older, declined during the period 2002-2015. It appears that the national trend was driven by large declines among the younger age groups, whereas adults aged 26 years and older actually experienced diverging trends, with increases in the prevalence of cannabis use disorders over the past few years.

There is no significant difference observed in the extent of cannabis use disorders among adults in the states that have measures for the medical or recreational use of cannabis and those that do not have such measures in place. However, the policy changes allowing the recreational use of cannabis may potentially increase cannabis use disorders among adults in the longer term.[116]

Cannabis use disorders are higher among those adults (18 years or older) without a high school diploma, among adults in part-time employment or not employed due to disability, among those who have never married, among those who have specific substance use disorders (tobacco, alcohol, cocaine and prescription opioids) and among adults who have experienced a major depressive episode.[117]

FIG. 37 Trends in cannabis use disorders among daily or near daily users in the United States, by age group, 2002-2015



Source: Key Substance Use and Mental Health Indicators in the United States: Results from the 2015 National Survey on Drug Use and Health

Cannabis regulation in Uruguay: provisions and recent developments

In 2013, the Government of Uruguay approved legislation (Law No. 19.172) regulating the cultivation, production, dispensing and use of cannabis for recreational purposes.[118] As the provisions regulating the recreational use of cannabis are being implemented gradually it is, however, too early to detect any effects from the regulations implemented to date.

113 Cannabis use disorder, according to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) is defined as a problem-causing pattern of cannabis use leading to clinically significant impairment or distress, as manifested by at least two distinguishing symptoms (e.g., cannabis is taken in larger amounts or for longer periods than intended; experience of craving; continued cannabis use despite the experience of physical, social, or interpersonal problems caused by cannabis use) occurring within a 12-month period.

114 Data from the National Survey on Drug Use and Health as reported in Compton and others, "Marijuana use and use disorders in adults in the USA, 2002-14".

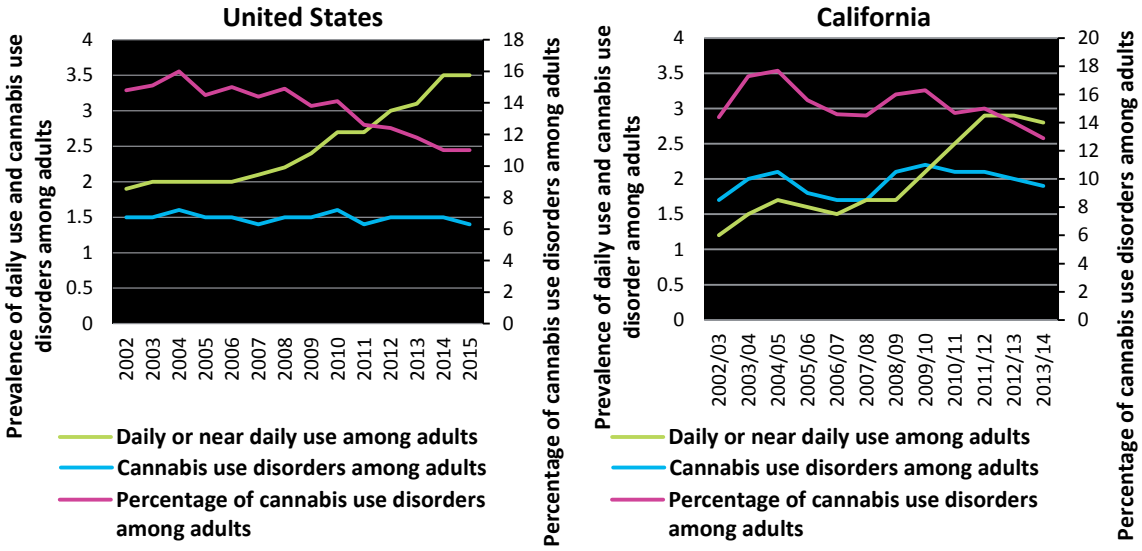
115 Alejandro Azofeifa, Margaret E Mattson, and others "National Estimates of Marijuana Use and Related Indicators — National Survey on Drug Use and Health", United States, 2002–2014. *MMWR Surveillance Summaries* 2016; 65 (No. SS-11):1–25. DOI: http://dx.doi.org/10.15585/mmwr.ss6511a1

116 bid.

117 Compton and others, "Use of marijuana for medical purposes among adults in the United States", pp. 209-211.

118 The main elements of regulation are given in the annex of this booklet.

FIG. 38 Prevalence and proportion of cannabis use disorders among daily or near daily adult (18 years or older) cannabis users, in the United States, 2002-2015



Sources: Wilson M. Compton and others, "Marijuana use and use disorders in adults in the USA, 2002-14: analysis of annual cross sectional surveys", *Lancet Psychiatry*, vol. 3, No. 10 (2016), pp. 954-964; Alejandro Azofeifa, Margaret E. Mattson and Rob Lyerla, "Supplementary material State level data: estimates of marijuana use and related indicators — national survey on drug use and health, California, 2002-2014" (Rockville, Maryland, Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration, (2016).

Since adopting the legislation, the Government has passed a number of additional decrees and ordinances concerning the regulation of specific elements such as regulating the medical use of cannabis, the marketing of non-medical cannabis through pharmacies, as well as the registration of users, marketing and dispensation of cannabis for recreational use, etc.

In accordance with the Uruguayan legislation, cannabis for recreational use can be obtained via registration with the national Institute for Regulation and Control of Cannabis (IRCCA) by opting for one of the three options: pharmacies, clubs or individual cultivation. Since the adoption of the law, some aspects of cannabis regulation have been implemented while other aspects, such as dispensation through pharmacies and commercial production, are being considered with provisions for monitoring compliance and controlling diversion. Key provisions and recent developments in each of these areas are summarized in the following sections.[119]

119 The information in this section is taken from the Institute for Regulation and Control of Cannabis.

Domestic cultivation

Domestic cultivation is meant for personal or shared use in a household in which each adult is allowed to cultivate up to six cannabis plants for personal consumption, with the final product not exceeding 480 grams in weight per year. The system for the registration of domestic cannabis cultivation was created in August 2014. Those who had already been cultivating cannabis had a period of up to six months to register with IRCCA. As of January 2017, 6,057 individuals had been registered for the domestic cultivation of cannabis – thus the production of 2,907 kg of cannabis had been authorized up until then.

Cannabis clubs

Cannabis clubs are registered and accredited as "civil associations" by the Ministry of Education and Culture and then registered with IRCCA for the purpose of collective cultivation, production and use of cannabis among their members. As of January 2017, 33 cannabis clubs had been registered in the country, each one with a minimum of 15 and a maximum of 45 adult members, with data about the club and

its members being protected. IRCCA has developed guidelines for operating conditions, infrastructure and other measures relating to cannabis clubs. A licence for cannabis cultivation is valid for three years, and each club can plant up to 99 cannabis plants, with an output proportional to the number of club members, and which may not exceed 480 grams of cannabis per person per year; any excess production is taken over by IRCCA. By the end of 2015, cannabis clubs had declared a total of 23.8 kg of cannabis produced; in 2016, they declared a total of 121.89 kg.

Sale through pharmacies

The dispensation of cannabis for recreational use will be allowed through "first class community pharmacies", as defined in the regulations and registered with IRCCA for the purpose. Although the dispensation of cannabis has not yet started, by February 2017, 83 pharmacies had expressed their interest, of which 14 had been registered. Pharmacies will sell cannabis exclusively to adults (18 years or older) who are registered in the system, with the total amount sold not to exceed 10 g per person per week or 40 g per month. Uruguayan citizenship or permanent residency in Uruguay is, however, required for registration. At the time of writing, the price of cannabis had been set at approximately $1.30 per gram, which may be readjusted at the time of dispensing.

Individuals registered for cannabis use through pharmacies

As also foreseen in other national laws and regulations, cannabis regulation in Uruguay recognizes the need for the protection of the personal data of those who are registered for personal cannabis use. IRCCA is developing a computer system for user registration that will use biometrics for the identification and validation of users. As foreseen by the law, the individual anonymization process will be reversible only at the request of a competent judge. At the time of writing, no individual had been registered to obtain cannabis through pharmacies.

Commercial production of cannabis

In August 2014, IRCCA began the process of soliciting the interest of potential producers and distributors of cannabis for recreational use through pharmacies. Interested parties were required to provide a detailed plan of production, facilities, varieties to be produced, phytosanitary management, records and quality control, product packaging and labelling conditions. The levels of THC, cannabidiol and cannabinol in proposed cannabis varieties have also been evaluated. Two enterprises have been granted a licence to produce 2 tons of cannabis each for distribution through pharmacies. The price for distribution from the producer to pharmacy has been established at $0.90 per gram, which will be adjusted annually. The product will be packaged with a maximum content of 10 g in containers that will preserve the product for a minimum of six months.

Limited scale of legal supply to date

As noted, only 6,057 individuals and 33 clubs with up to 45 members can now produce cannabis legally, potentially providing legal supply to only around 7,500 out of the estimated 140,000 past-month cannabis users who live in Uruguay. The impact of provisions regulating the recreational use of cannabis will only be evident after those have been fully implemented and will require close monitoring over time.

Therapeutic effects of cannabis and cannabinoids

	Conclusive/substantive evidence	Moderate evidence	Limited evidence	No or insufficient evidence to support or refute
Evidence that cannabis or cannabinoids are effective for…	• Treatment of chronic pain in adults (cannabis) • Anti-emetics in the treatment of chemotherapy-induced nausea and vomiting (oral cannabinoids) • Improving patient-reported multiple sclerosis spasticity symptoms (oral cannabinoids)	• Improving short-term sleep outcomes in individuals with sleep disturbance associated with obstructive sleep apnea syndrome, fibromyalgia, chronic pain and multiple sclerosis (cannabinoids, primarily nabiximols)	• Increasing appetite and decreasing weight loss associated with HIV/AIDS • Improving clinician-measured multiple sclerosis spasticity symptoms (cannabis and oral cannabinoids) • Improving symptoms of Tourette's syndrome (THC capsules) • Improving anxiety symptoms, as assessed by a public speaking test, in individuals with social anxiety disorders (cannabidiol) • Improving symptoms of post-traumatic stress disorder (nabilone; a single, small fair-quality trial) • There is limited evidence of a statistical association between cannabinoids and better outcomes (i.e., mortality, disability) after a traumatic brain injury or intracranial haemorrhage (cannabinoids)	• Cancers, including glioma (cannabinoids) • Cancer-associated anorexia cachexia syndrome and anorexia nervosa (cannabinoids) • Symptoms of irritable bowel syndrome (dronabinol) • Epilepsy (cannabinoids) • Spasticity in patients with paralysis resulting from spinal cord injury (cannabinoids) • Symptoms associated with amyotrophic lateral sclerosis (cannabinoids) • Chorea and certain neuropsychiatric symptoms associated with Huntington's disease (oral cannabinoids) • Motor system symptoms associated with Parkinson's disease or the levodopa-induced dyskinesia (cannabinoids) • Dystonia (nabilone and dronabinol) • Achieving abstinence from the use of addictive substances (cannabinoids) • Mental health outcomes in individuals with schizophrenia or schizophreniform psychosis (cannabinoids)
Evidence that cannabis or cannabinoids are ineffective for…			• Improving symptoms associated with dementia (cannabinoids) • Improving intraocular pressure associated with glaucoma (cannabinoids) • Reducing depressive symptoms in individuals with chronic pain or multiple sclerosis	

Source: National Academies of Sciences, Engineering, and Medicine, *The Health Effects Of Cannabis And Cannabinoids: The Current State of Evidence and Recommendations for Research* (Washington, D. C, National Academies Press, 2017).

Statistical association between cannabis use and health conditions

	Conclusive/substantive evidence	Moderate evidence	Limited evidence	No or insufficient evidence to support or refute
Statistical association between cannabis use and...	• Worse respiratory symptoms and more frequent chronic bronchitis episodes (long-term cannabis smoking) • Increased risk of motor vehicle crashes • Lower birth weight of the offspring (maternal cannabis smoking) • Development of schizophrenia or other psychoses, with the highest risk among the most frequent users • Increases in cannabis use frequency and the progression to developing problem cannabis use • Being male and the severity of problem cannabis use, but the recurrence of problem cannabis use does not differ between males and females	• Improved airway dynamics with acute use, but not with chronic use (cannabis smoking) • Higher forced vital capacity (cannabis smoking) • Cessation of cannabis smoking and improvements in respiratory symptoms • Increased risk of overdose injuries, including respiratory distress, among paediatric populations in states in the United States where the use of cannabis is legal • Impairment in the cognitive domains of learning, memory and attention (acute cannabis use) • Better cognitive performance among individuals with psychotic disorders and a history of cannabis use • Increased symptoms of mania and hypomania in individuals diagnosed with bipolar disorders (regular cannabis use) • A small increased risk for the development of depressive disorders • Increased incidence of suicidal ideation and suicide attempts with a higher incidence among heavier users • Increased incidence of suicide completion • Increased incidence of social anxiety disorder (regular cannabis use) • A persistence of problem cannabis use and a history of psychiatric treatment • Problem cannabis use and increased severity of post-traumatic stress disorder symptoms • Development of substance dependence and/or a substance abuse disorder for substances, including alcohol, tobacco, and other illicit drugs	• Non-seminoma-type testicular germ cell tumours (current, frequent or chronic cannabis smoking) • The triggering of acute myocardial infarction (cannabis smoking) • Ischemic stroke or subarachnoid hemorrhage • Decreased risk of metabolic syndrome and diabetes • Increased risk of prediabetes • Increased risk of developing chronic obstructive pulmonary disease (COPD) when controlled for tobacco use (occasional cannabis smoking) • A decrease in the production of several inflammatory cytokines in healthy individuals (cannabis smoking) • Pregnancy complications for the mother (maternal cannabis smoking) • Admission of the infant to the neonatal intensive care unit (maternal cannabis smoking) • Impaired academic achievement and education outcomes • Increased rates of unemployment and/or low income • Impaired social functioning or engagement in developmentally appropriate social roles • Sustained abstinence from cannabis use and impairments in the cognitive domains of learning, memory and attention • Increase in positive symptoms of schizophrenia (e.g., hallucinations) among individuals with psychotic disorders • Likelihood of developing bipolar disorder, particularly among regular or daily users	• Incidence of esophageal cancer (cannabis smoking • Incidence of prostate cancer, cervical cancer, malignant gliomas, Non-Hodgkin is lymphoma, penile cancer, anal cancer, Kaposi's sarcoma or bladder cancer • Subsequent risk of developing acute myeloid leukaemia • Acute non-lymphoblastic leukaemia, acute lymphoblastic leukaemia, rhabdomyosarcoma, astrocytoma or neuroblastoma in offspring (parental cannabis use) • Increased risk of acute myocardial infarction (chronic effects of cannabis use) • Hospital admissions for COPD (cannabis smoking) • Asthma development or asthma exacerbation (cannabis smoking) • Other adverse immune cell responses in healthy individuals (cannabis smoking) • Adverse effects on immune status in individuals with HIV (cannabis or dronabinol use) • Increased incidence of oral human papilloma virus (regular cannabis use) • All-cause mortality (self-reported cannabis use) • Occupational accidents or injuries (general, non-medical cannabis use) • Death resulting from cannabis overdose • Later outcomes in the offspring (e.g., sudden infant death syndrome, cognition/academic achievement and later substance use) (maternal cannabis smoking)

			• Development of any type of anxiety disorder, except social anxiety • Increased symptoms of anxiety (near-daily cannabis use) • Increased severity of post-traumatic stress disorder symptoms among individuals with post-traumatic stress disorder • Initiation of tobacco use • Changes in the rates and use patterns of other licit and illicit substances	• Changes in the course or symptoms of depressive disorders • Development of post-traumatic stress disorder
No statistical association between cannabis use and…		• Incidence of lung cancer (cannabis smoking) • Incidence of head and neck cancer • Worsening of negative symptoms of schizophrenia (e.g., blunted affect) among individuals with psychotic disorders	• Progression of liver fibrosis or hepatic disease in individuals with viral hepatitis C (daily cannabis use) • Childhood anxiety and childhood depression are risk factors for the development of problem cannabis use	
Other evidence	• Stimulant treatment of attention deficit hyperactivity disorder (ADHD) during adolescence is not a risk factor for the development of problem cannabis use • Being male and smoking cigarettes are risk factors for the progression of cannabis use to problem cannabis use • Initiating cannabis use at an earlier age is a risk factor for the development of problem cannabis use	• Anxiety, personality disorders and bipolar disorders are not risk factors for the development of problem cannabis use • Major depressive disorder is a risk factor for the development of problem cannabis use • Adolescent ADHD is not a risk factor for the development of problem cannabis use • Being male is a risk factor for the development of problem cannabis use • Exposure to the combined use of abused drugs is a risk factor for the development of problem cannabis use • Neither alcohol nor nicotine dependence alone are risk factors for the progression from cannabis use to problem cannabis use • During adolescence the frequency of cannabis use, oppositional behaviours, a younger age of first alcohol use, nicotine use, parental substance use, poor school performance, antisocial behaviours and childhood sexual abuse are risk factors for the development of problem cannabis use	• Childhood anxiety and childhood depression are risk factors for the development of problem cannabis use	

Source: National Academies of Sciences, Engineering, and Medicine, *The Health Effects Of Cannabis And Cannabinoids: The Current State of Evidence and Recommendations for Research* (Washington, D. C, National Academies Press, 2017).

Regulations for legalizing the use of cannabis within jurisdictions in the United States of America

	Alaska	California	Colorado	District of Columbia	Maine
Legal Process	Voter initiative, state statute	Voter initiative	Voter initiative, amendment to state constitution	Voter initiative	Voter initiative
Title	Ballot Measure 2	Proposition 64	Amendment 64	Initiative 71	Question 1
Date passed	November 2014	November 2016	November 2012	November 2014	November 2016
Date implemented/ required date of rule adoption	February 2015: Personal possession, consumption, cultivation October 2016: Retail sales	Not stated, but licences to be issued by 11 January 2018	December 2012: Personal possession, consumption, cultivation January 2014: Retail sales	February 2015: Personal possession, consumption, cultivation	Take effect on 7 January 2017; regulation for business to be in place August 2017
Regulatory authority	Marijuana Control Board (Alcoholic Beverage Control Board)	Bureau of Marijuana Control	Marijuana Enforcement Division (Department of Revenue)	Not applicable; considering separate legislation to regulate commercial production and sale to adults	Department of Agriculture, Conservation and Forestry
Minimum age	21	21	21	21	21
Residency requirement	None	Not specified	None	None	Not specified
Personal possession quantity	28.5 g	1 oz flower 8 g concentrate	28.5 g	57 g	2.5 oz (70.8 g) 5g concentrate
Home cultivation	Six plants, three of which can be flowering; not subject to public views; within property with lawful possession or with consent of the person in lawful possession	Six plants, away from view	Six plants, three of which can be flowering	Six plants per person; Twelve plants per household, six of which can be flowering	Six mature plants, twelve immature plants, unlimited amount of seedlings away from view and tagged with personal identification number. Property owners can prohibit home cultivation. Cultivation for medical purposes not subject to same restrictions
Interpersonal sharing	28.5 g	Yes	28.5 g	28.5 g	Yes for home grow. Not permitted for retail marijuana
Retail transaction limit	28.5 g	Not specified, presumably same limits for personal possession	Residents: 28.5 g Non-residents: 7 g	Not applicable	2.5 oz. of marijuana Twelve seedlings
Retail pricing structure	Market	Market/commercial	Market	Market	Market/commercial
Average retail price per gram after tax	Average price $14		$11.50	Not applicable	
Maximum THC content	Not set initially	Not set initially	Not set initially	Not set initially	Not set initially
Registration requirements	None	Not specified	None	None	Not specified

	Alaska	California	Colorado	District of Columbia	Maine
Commercial production	Licensed cannabis producers	Licensed cultivators and manufacturers, varying types	Licensed cannabis cultivation facilities	None	Licensed cultivators; two types based on size
Commercial distribution	Licensed retail cannabis stores	Limits on market concentration	Licensed retail cannabis stores	None	State authority may not limit total number of stores; localities may regulate number and location of establishments
Restrictions on edibles	5 mg of THC for single serving, no more than 50 mg of homogenous THC allowed per package. Child-resistant packaging required. Separate warnings on risks, not appealing to children	10 mg THC per serving. Warning and potency labels. List of ingredients and cannabinoid content	Maximum of 10 mg of THC in each individually packed serving; warning labels "keep out of reach of children"; THC symbol on labels and not attractive to children	Currently not allowed	Serving size and potency limits to be developed in regulations. List of ingredients packing and labels; products and edibles may not contain additives designed to make product more appealing to children
Advertising	Final advertising regulations to be determined by the Alaska Department of Health and Social Services Division of Public Health	Restricted to those over 21. Restrictions on false advertisement or claims of untrue health benefits. Products cannot appeal to children	Restricted to media with no more than 30 per cent of the audience under the age of 21	Not applicable, no commercial market	Restricted to those over 21. Restrictions on false advertisement or claims of untrue health benefits. Products cannot appeal to children
Taxation	$50 excise tax per ounce on sales or transfers from cultivation facility to retail store or product manufacturer; other parts of plant, e.g., stems and leaves are taxed at $15 per ounce	15 per cent excise on retail, $9.25 per dry weight ounce on flower after harvest. $2.75 per drug weight ounces on leaves	15 per cent excise tax on cultivation; 10 per cent retail marijuana sales tax to be decreased to 8per cent in July 2017 2.9 per cent state sales tax Up to 3.5 per cent local sales taxes	Not applicable, no commercial market	10 per cent excise on retail
Cannabis clubs	Not explicitly allowed or prohibited; Earlier ban on in-store consumption repealed in November 2015	Not specified though they may exists in the form of microbusiness that allow on site consumption	Not allowed	Not allowed; currently under investigation by city task force.	Allowed
Medical cannabis	1998: Patient registry, no dispensaries registration; out-of-state patients recognized for approved conditions but not for dispensary purchases; possession, home cultivation	1996 and 2003; Patient registry - voluntary registration; cooperatives and collectives; State-wide licensing of dispensaries will begin 2018	2000: Patient registry, dispensaries already existed; out-of-state patients not recognized; possession, consumption; 2010: commercial production and sales	1998/2010: Patient registry; dispensaries allowed	1999: Patient registry or identifaction card; dispensaries, recognizes patients from other states but not for dispensary purchases

Regulations for legalizing the use of cannabis within jurisdictions in the United States of America and Uruguay (continued)

	Massachusetts	Nevada	Oregon	Washington	Uruguay
Legal Process	Voter initiative	Voter initiative	Voter initiative, state statute	Voter initiative, state statute	Government initiative, national law
Title	Question 4	Question 2	Measure 91	Initiative 502	Law No. 19.172
Date passed	November 2016	November 2016	November 2014	November 2012	December 2013
Date implemented/ required date of rule adoption	15 September 2017. Licences issued starting 1 October 2017	Takes effect on 1 January 2017 and regulations to be in place by 1 January 2018	July 2015: Personal possession, consumption, cultivation October 2015 up to December 2016: Retail sales through medical dispensaries January 2017: retail sales through licensed retailers	December 2012: Personal possession, consumption July 2014: Retail sales	August 2014: Personal cultivation October 2014: Grower clubs Mid-2017: pharmacy sales
Regulatory authority	1) Cannabis Control Commission, and 2) Cannabis Advisory Board	Department of Taxation	Oregon Liquor Control Commission	Liquor and Cannabis Board (formerly the Liquor Control Board)	Institute for the Regulation and Control of Cannabis (IRCCA)
Minimum age	21	21	21	21	18
Residency requirement	Not specified	Not specified	None	None	Uruguayan citizenship or permanent Uruguayan residency required
Personal possession quantity	1 oz. flower (28.5 g) 5g concentrate	1 oz. flower 3.5g concentrate	In public: 28.5 g At home: 228 g	28.5 g	40 g per month
Home cultivation	6 plants, 12 in a single residence away from view; 10 oz. of dried marijuana permitted at home	Six plants, no more than twelve on property in indoor or in enclosed with permission of landlord and must be 25 miles away from retail cannabis store	Four plants in flower	Not allowed	Six plants in flower
Interpersonal sharing	Yes	Yes	28.5 g	Not allowed	Allowed within the home
Retail transaction limit	Not specified, presumably same limits as for personal possession	Not specified, presumably same limits as for personal possession	7 g	28.5 g	40 g per month, 10 g per week (sale through pharmacies to registered users)
Retail pricing structure	Market/commercial	Market/commercial	Market	Market	Government price control
Average retail price per gram after tax			$10	$10.00	$1.20
Maximum THC content	Not set initially	Not set initially	Not set initially	Not set initially	15 per cent maximum THC content (suggested criterion not fixed by law)
Registration requirements	Personal data collection not required	Personal data collection not required	None	None	Yes, with IRCCA for any of the three modes of access

	Massachusetts	Nevada	Oregon	Washington	Uruguay
Commercial production	Licensed establishments	Licensed establishment	Licensed cannabis producers	Licensed cannabis producers	Licensed marijuana producers
Commercial distribution	Licensed establishments; localities can regulate, limit or prohibit the operation of businesses	Limits on market concentration by population	Licensed retail cannabis stores	Licensed retailers	Licensed pharmacies
Restrictions on edibles	Serving size and potency limits to be developed in regulations. List of ingredients	Not specified	Maximum of 10 mg of THC in each individually packed serving; edible products to undergo a preapproval process; not appealing to children	10 mg of THC in each individually packaged serving; child-proof packaging; THC labelling; marijuana-infused products, packages and labels be approved by the State Liquor Control Board before sale	
Advertising	Restrictions on marketing to children to be developed in regulations	Restrictions to be developed in regulations	Entry sign required on exterior of dispensaries; Oregon Liquor Control Commission has authority to further regulate or prohibit advertising	Limited to one sign for retailers at business location	Prohibited
Taxation	3.75 per cent excise on retail	15 per cent excise on retail	No tax on retail sales from October 2015 to December 2015 25 per cent sales tax after 5 January 2016 17 per cent sales tax 2017 with options for local communities to establish local tax up to 3 per cent	July 2014-June 2015: 25 per cent tax at each stage (production, processing, retail) July 2015: 37 per cent sales tax	No tax, although IRCCA can impose tax in the future.
Cannabis clubs	Not allowed although they may exist in establishments that allow on-site-consumption	Not specified	Not allowed	Not allowed	Clubs with 15-45 members allowed to cultivate up to 99 plants, maximum 480 g of dried product per member per year
Medical cannabis	2012/2013; patient registry or identification cards; dispensaries, out-of-state patients not recognized	2000: Patient registry or identification card, No dispensaries; recognize out of state patients if other state's programmes are substantially similar; patients must fill out Nevada paper work	1998: Patient registry, dispensaries already existed but not clearly authorized by law or regulated; possession, home cultivation	1999/2010/2011; no registration or identification card; dispensaries approved as of November 2012, first stores opened in July 2014: 1999 possession 2012: Home cultivation	2014: Passed, but not yet effective

GLOSSARY

amphetamine-type stimulants — a group of substances composed of synthetic stimulants that were placed under international control in the Convention on Psychotropic Substances of 1971 and are from the group of substances called amphetamines, which includes amphetamine, methamphetamine, methcathinone and the "ecstasy"-group substances (3,4-methylenedioxymethamphetamine (MDMA) and its analogues).

amphetamines — a group of amphetamine-type stimulants that includes amphetamine and methamphetamine.

annual prevalence — the total number of people of a given age range who have used a given drug at least once in the past year, divided by the number of people of the given age range, and expressed as a percentage.

coca paste (or coca base) — an extract of the leaves of the coca bush. Purification of coca paste yields cocaine (base and hydrochloride).

"crack" cocaine — cocaine base obtained from cocaine hydrochloride through conversion processes to make it suitable for smoking.

cocaine salt — cocaine hydrochloride.

new psychoactive substances — substances of abuse, either in a pure form or a preparation, that are not controlled under the Single Convention on Narcotic Drugs of 1961 or the 1971 Convention, but that may pose a public health threat. In this context, the term "new" does not necessarily refer to new inventions but to substances that have recently become available.

opiates — a subset of opioids comprising the various products derived from the opium poppy plant, including opium, morphine and heroin.

opioids — a generic term applied to alkaloids from opium poppy (opiates), their synthetic analogues (mainly prescription or pharmaceutical opioids) and compounds synthesized in the body.

problem drug users — people who engage in the high-risk consumption of drugs; for example, people who inject drugs, people who use drugs on a daily basis and/or people diagnosed with drug use disorders (harmful use or drug dependence), based on clinical criteria as contained in the Diagnostic and Statistical Manual of Mental Disorders (fifth edition) of the American Psychiatric Association, or the International Classification of Diseases (tenth revision) of the World Health Organization.

people who suffer from drug use disorders/people with drug use disorders — a subset of people who use drugs. People with drug use disorders need treatment, health and social care and rehabilitation. Dependence is a drug use disorder.

prevention of drug use and treatment of drug use disorders — the aim of "prevention of drug use" is to prevent or delay the initiation of drug use, as well as the transition to drug use disorders. Once there is a drug use disorder, treatment, care and rehabilitation are needed.

REGIONAL GROUPINGS

The World Drug Report uses a number of regional and subregional designations. These are not official designations, and are defined as follows:

- East Africa: Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Mauritius, Rwanda, Seychelles, Somalia, Uganda and United Republic of Tanzania
- North Africa: Algeria, Egypt, Libya, Morocco, South Sudan, Sudan and Tunisia
- Southern Africa: Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe
- West and Central Africa: Benin, Burkina Faso, Cameroon, Cabo Verde, Central African Republic, Chad, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Sao Tome and Principe, Senegal, Sierra Leone and Togo
- Caribbean: Antigua and Barbuda, Bahamas, Barbados, Bermuda, Cuba, Dominica, Dominican Republic, Grenada, Haiti, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines and Trinidad and Tobago
- Central America: Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama
- North America: Canada, Mexico and United States of America
- South America: Argentina, Bolivia (Plurinational State of), Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, Uruguay and Venezuela (Bolivarian Republic of)
- Central Asia and Transcaucasia: Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan
- East and South-East Asia: Brunei Darussalam, Cambodia, China, Democratic People's Republic of Korea, Indonesia, Japan, Lao People's Democratic Republic, Malaysia, Mongolia, Myanmar, Philippines, Republic of Korea, Singapore, Thailand, Timor-Leste and Viet Nam
- South-West Asia: Afghanistan, Iran (Islamic Republic of) and Pakistan
- Near and Middle East: Bahrain, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, State of Palestine, Syrian Arab Republic, United Arab Emirates and Yemen
- South Asia: Bangladesh, Bhutan, India, Maldives, Nepal and Sri Lanka
- Eastern Europe: Belarus, Republic of Moldova, Russian Federation and Ukraine
- South-Eastern Europe: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Montenegro, Romania, Serbia, the former Yugoslav Republic of Macedonia and Turkey
- Western and Central Europe: Andorra, Austria, Belgium, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, Netherlands, Norway, Poland, Portugal, San Marino, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom of Great Britain and Northern Ireland
- Oceania: Australia, Fiji, Kiribati, Marshall Islands, Micronesia (Federated States of), Nauru, New Zealand, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu and small island territories

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To celebrate 20 years since its inception, the *World Drug Report 2017* is presented in a new five-booklet format designed to improve reader friendliness while maintaining the wealth of information contained within.

Booklet 1 summarizes the content of the four subsequent substantive booklets and presents policy implications drawn from their findings. Booklet 2 deals with the supply, use and health consequences of drugs. Booklet 3 focuses on the cultivation, production and consumption of the three plant-based drugs (cocaine, opiates and cannabis) and on the impact of new cannabis policies. Booklet 4 provides an extended analysis of the global synthetic drugs market and contains the bulk of the analysis for the triennial global synthetic drugs assessment. Finally, Booklet 5 contains a discussion on the nexus between the drug problem, organized crime, illicit financial flows, corruption and terrorism.

Enhanced by this new format, the *World Drug Report 2017* is, as ever, aimed at improving the understanding of the world drug problem and contributing towards fostering greater international cooperation for countering its impact on health and security.

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